JULY 15, 1961

Chemical Week

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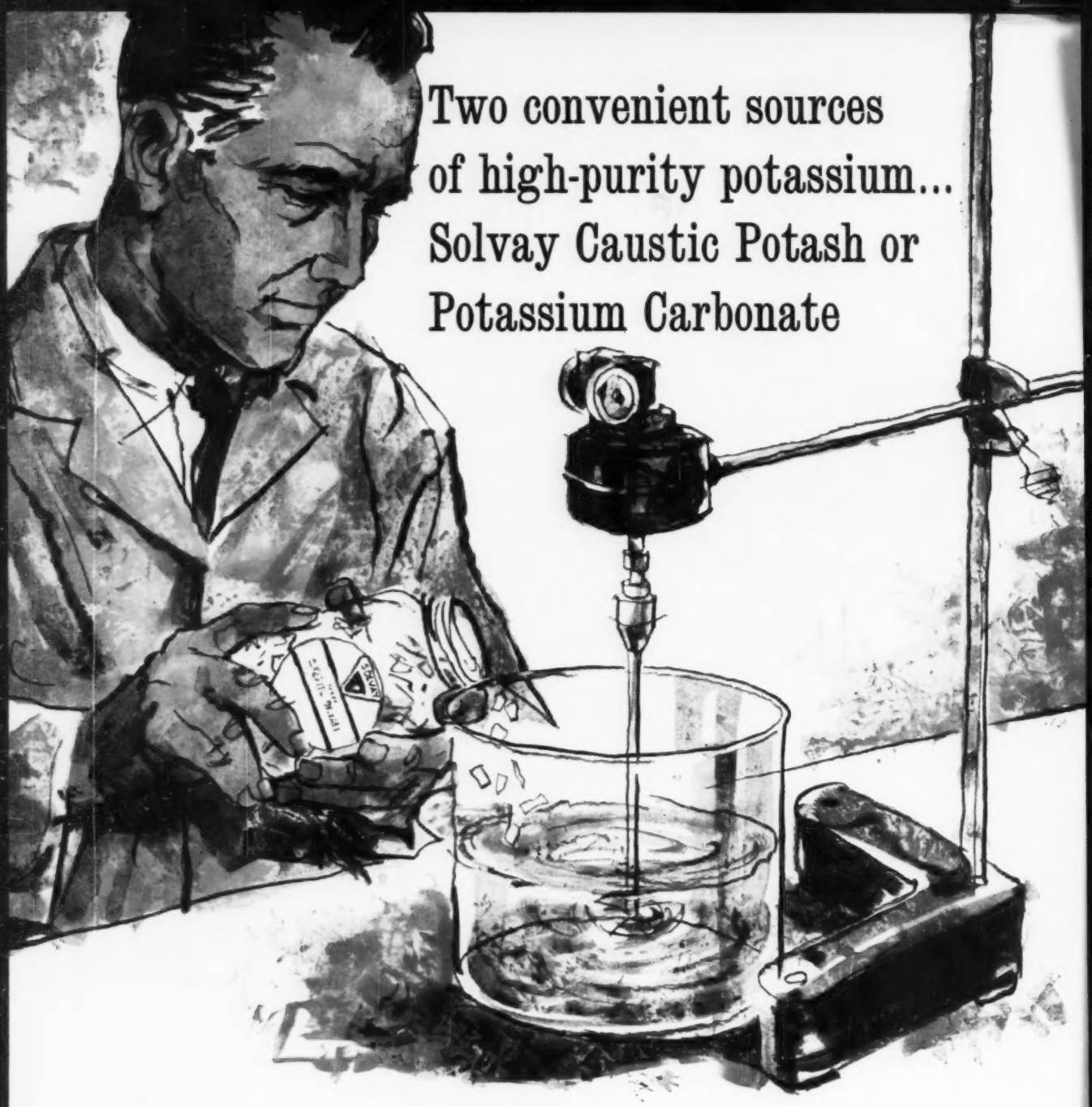

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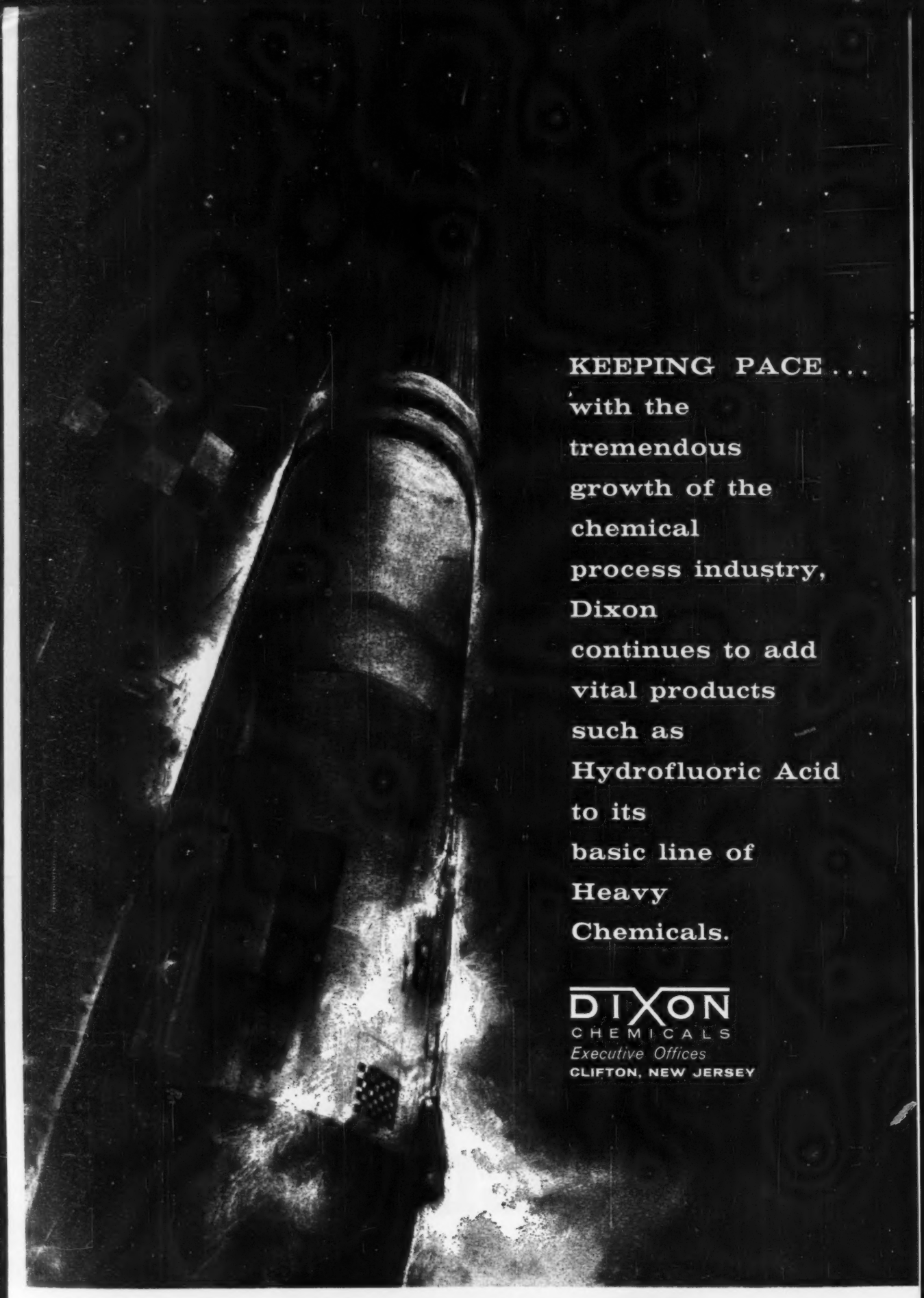
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ON THE COVER: H. W. Fisher directs Standard Oil Co.'s (New Jersey) foreign petrochemical operations—one of the largest international chemical programs of any U.S. company (p. 109).

Chemical Week

Vol. 89, No. 2 JULY 15, 1961

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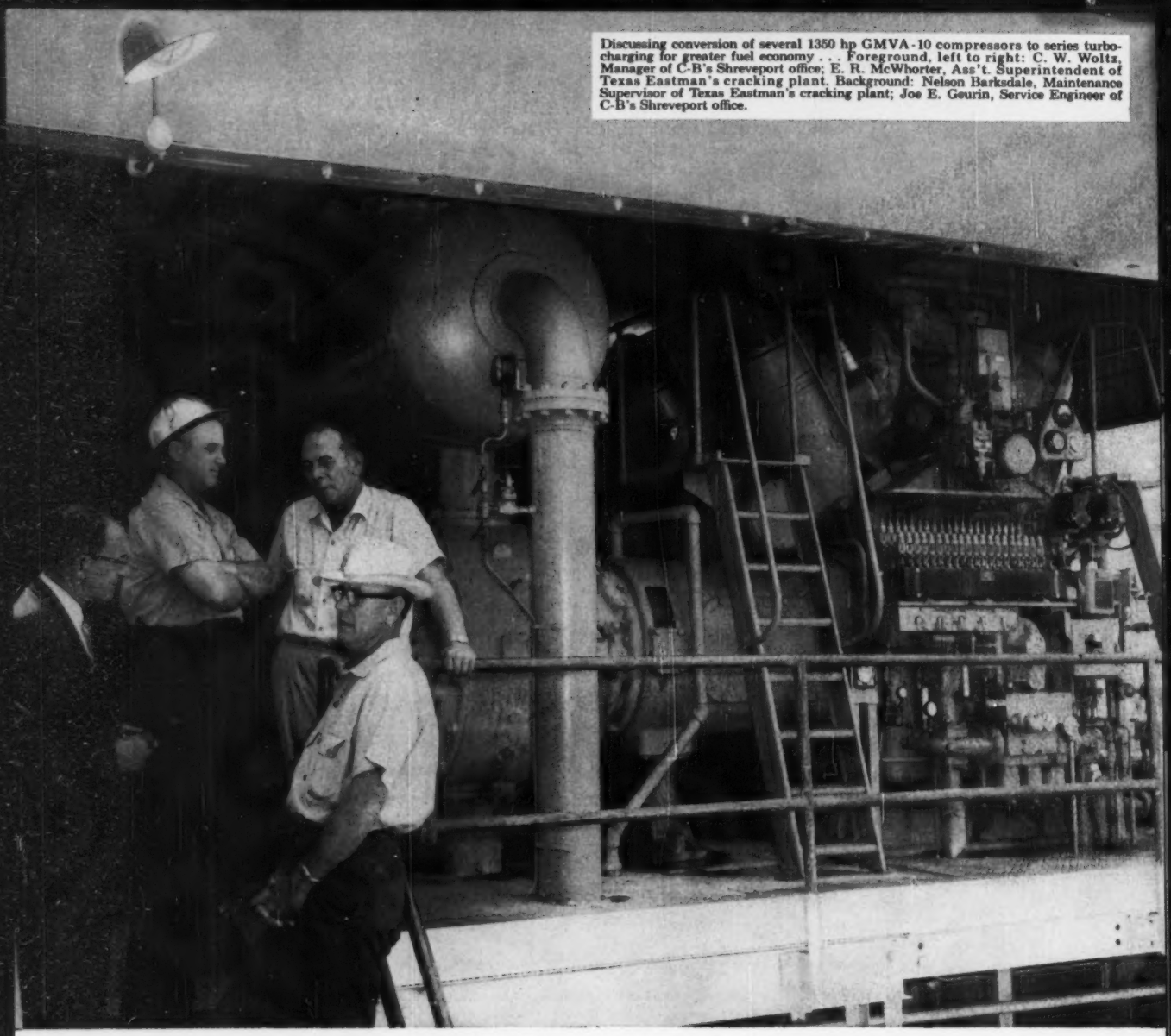

Discussing conversion of several 1350 hp GMVA-10 compressors to series turbo-charging for greater fuel economy . . . Foreground, left to right: C. W. Woltz, Manager of C-B's Shreveport office; E. R. McWhorter, Ass't. Superintendent of Texas Eastman's cracking plant. Background: Nelson Barksdale, Maintenance Supervisor of Texas Eastman's cracking plant; Joe E. Geurin, Service Engineer of C-B's Shreveport office.

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France Needs Integration

The reports on this page and p. 7 are by CW Editor-in-Chief Howard C. E. Johnson, on a seven-nation tour of Europe's chemical industries.

Paris—Long lunch-hours shouldn't fool anyone into thinking that the French are taking it easy. Even though they enjoy their midday siestas, French chemical executives are often at their desks at 8 in the morning, still there during the long twilights that characterize Paris evenings.

After outstripping all other French industries on production gains in '59 and '60, expansion of France's chemical industry slowed down considerably this year. At the same time, the industry's foreign trade, which showed a surplus of exports over imports in '59 and '60, started a move in the other direction. with exports slipping 1% and imports shooting up by 13% in the first quarter of '61, compared with same period of '60.

This doesn't mean trouble. Poor results in the first quarter are likely to be corrected by big gains during the rest of the year. And the rate of expansion in the first quarter was a respectable 7%—although it looks slim compared with the whopping 16 to 18% rise during '60.

The industry's sales in '60 were some 3.5 billion dollars, exports to foreign countries 368 million dollars (up 30% from the preceding year), and imports $347 million (up 35%). Investments are estimated at about $172 million in '60. For the six years from the end of '59 to the end of '65, investments are pegged at $1,333 million, or a rate of over 222 million per year. Most of this will go into organic chemical production. The industry employs 230,000.

The trouble with France's chemical industry is that it is split up into 1,700 enterprises, most of which are quite small. In '59, it was estimated that the top ten French chemical companies accounted for only 25% of the industry's sales, compared with 33% for Germany's top three and 50% for Montecatini alone in Italy. No comparable estimate has yet been made for '60, but trade sources think the situation hasn't changed much.

However, it will change in coming years. Two of France's top companies, Pechiney and Saint-Gobain, decided at the end of '59 to merge their chemical activities, from sales to production and research. A joint affiliate, Pechiney-Saint-Gobain, has already merged sales of the two companies' chemical products. The two firms expect complete integration of production by next year.

And a similar move has just been made by Rhone-Poulenc and Celtex. Stockholders of the two companies are being asked to approve a merger of synthetic textile and plastic production in France and foreign countries. A joint affiliate of the two companies, Rhodiaceta, will also take over synthetic textile production of a Pechiney affiliate, Organico.

Thus, France's big chemical companies are concentrating to meet the formidable and growing competition they will face in the Common Market. They are also strengthening their position in other markets, not only vis-a-vis their European competitors but also against U.S. companies whose participation as producers in the Common Market is beginning to worry them.

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Purity (wt per cent) min	98.0
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Acidity, as acetic acid (wt per cent) max	0.001
Color (Pt-Co) max	10
Water (wt per cent) max	0.10
Carbonyl Number (mg KOH/g) max	0.2
Distillation (°C)	
Initial min	149
Dry Point max	156
Appearance: Clear and Free of Suspended Matter	

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Britain's Economic Paradox

This report is from CW's Editor-in-Chief, Howard C. E. Johnson *(see p. 5.)*

London—Great Britain is suffering an austere prosperity. Although it has full employment, and its home sales, exports, and capital investment are all on the rise, its rate of expansion is lagging well behind its continental competitors. The economy operates within a straightjacket imposed by repeated balance-of-payments crises.

Problem on the exchange comes from rising imports, a disappointing growth in exports, and a fall-off in earnings from Britain's traditional "invisible" trade, like shipping and banking. While world trade has risen 50% since '53, U.K. exports have climbed only 28%—compared with a 156% gain for the Germans and a 180% rise for the Italians. U.K. export prices—certainly a factor in this showing—have risen during that period by 10%, while German prices have gone up only 2%, and the Swiss have managed a 4% reduction.

One cause of Britain's troubles seems to be ultra-conservatism in building up plant capacity. The chemical industry is less guilty than others on this score, but to some extent it shares the profound distaste for excess plant. As a result, when domestic demand rises sharply, the British must resort to imports, thus tipping the balance of payments in the wrong direction.

Nor is the U.S. guiltless in contributing to Great Britain's problems: Throughout the U.K. and also in France one hears complaints about dumping by U.S. chemical manufacturers. The Europeans have antidumping laws, but they operate more slowly than ours, and by the time the official machinery has moved the damage has been done.

British chemical companies hope to see their exports rise more sharply this year than the disappointing 8% increase registered during '60. But hard selling is called for: exports through May were up only 6.5% over the corresponding period last year. And the British don't look for any major increases in sales to the Western Hemisphere nor in the Commonwealth, where their traditional dominance has been eroded by competition from the U.S., Japan, and continental Europe. The best hopes for boosting exports are the Common Market, EFTA and the Communist bloc.

With the government once again tightening the lid on the economy, there's increasing debate in Britain on what's wrong and what to do about it. Last month *The Economist*—in an article headed "The Laocoon Economy"—touched on the heavy hand of government control:

"At present Britain tends to get worried only when declining industries fall below their 'normal' rates of full employment, and so is apt to thrust out government aid or tariff protection to its least economic industries like shipbuilding or fishing or horticulture. It gets much less worried when growth industries fail to reach targets which could reasonably have been set for them. Indeed, when growth industries do grow, it is usual for Britain to say that these industries are voraciously demanding an unfair share of scarce resources, and to devise discriminatory restrictions specifically to keep them down. . . . A country that had accustomed itself to looking forward would surely see that this bias towards always restricting the natural growing points of an economy, and towards always corseting the dying ones, is precisely the reverse of what is needed."


Acetaldehyde Ammonia
Acetophenone
Acetyl Chloride
Adipoyl Chloride
Anisic Aldehyde
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p-Chlorbenzhydrol
p-Chlorbenzhydryl Chloride
p-Chlorbenzophenone
p-Chlorbenzyl Cyanide
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LETTERS

Reciprocal Purchasing

TO THE EDITOR: You are to be congratulated on your article "Purchasing Joins the CPI Marketing Team" (*June 3, p. 69*), wherein you bring the term "reciprocity" into the open. It is usually spoken *sotto-voce* by American businessmen, and the coining of the phrase "trade relations" gives proof of the existence of a guilt-complex that demands its concealment.

My guess: if, as a result of your editorial frankness, you were to allow open-forum discussion of this subject in your columns, you would evoke response that would rival the reception of the Lincoln-Douglas debates of 103 years ago! Today's headlines are rife with "untying the knot" (elimination of price-rigging, restrictive trade practices and monopolistic practices), so I suspect that your writer used the front-cover title "Reciprocity ties the knot" deliberately.

Three questions to Messrs. Clem and Miller, who are featured in your article:

(1) Have they realized that if reciprocal purchasing is pursued to its ultimate (the full circle of "trading" in a group of captive markets), they themselves would become unnecessary in the picture?

(2) Acknowledging the statement (*p. 70*) that the cost of distributing products is high, have they taken the logical step and eliminated those salesmen from their corporate force who formerly were deemed necessary to obtain the reciprocal volume, or are they still further compounding their high distribution costs by retaining those salesmen as a "safety measure"?

(3) While sales volume increases can easily be proved as a result of pursuing a policy of reciprocal purchasing, have these men made a corresponding study of the potential that could be gained by increasing the effectiveness of their respective sales forces, disdaining their "trade relations" practices, and doing some energetic selling?

RUSSELL R. RADFORD
Brooklyn Heights, N.Y.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

MEETINGS

Gordon Research Conferences, July 17-21; Colby Junior College, New London, N.H.—elastomers; New Hampton School, New Hampton, N.H.—radiation chemistry; Kimball Union Academy, Meriden, N.H.—organic coatings; Tilton School, Tilton, N.H.—microbiological deterioration.

National Assn. of Power Engineers, national convention, Sheraton-Gibson Hotel, Cincinnati, July 17-21.

Western Plant Maintenance and Engineering Show, Pan Pacific Auditorium, Los Angeles, July 18-20.

American Oil Chemists' Society, short course on "Newer Lipid Analyses," University of Rochester, July 23-26.

University of California at Los Angeles, "Statistical Methods in Industry," annual program, UCLA campus, July 31-Aug. 11.

Case Institute of Technology, digital-control systems course, Cleveland, July 31-Aug. 11.

The Chemical Institute of Canada, 44th Canadian Chemical Conference and Exhibition, Queen Elizabeth Hotel, Montreal, Aug. 3-5.

18th International Congress of Pure and Applied Chemistry, Montreal, Can., Aug. 6-12.

University of Michigan, Cryogenic Engineering Conference, Ann Arbor, Mich., Aug. 15-17.

Technical Assn. of the Pulp and Paper Industry, 12th testing conference, Queen Elizabeth Hotel, Montreal, Que., Aug. 15-17.

United Nations Conference on New Sources of Energy, Ciro Massino, Rome, Italy, Aug. 21-31.

Wayne State University, international conference on coordination chemistry, Detroit, Aug. 21-Sept. 1.

Western Electronics Show and Conference, Cow Palace Hotel, San Francisco, Aug. 22-25.

Mathematical Assn. of America, summer meeting, Oklahoma State University, Stillwater, Aug. 28-31.

American Society of Mechanical Engineers, international conference on heat transfer, University of Colorado, Boulder, Aug. 28-Sept. 1.

President, The Standard Oil Company (Ohio)

Charles Spahr tells why he feels Cleveland-Northeast Ohio is better than ever

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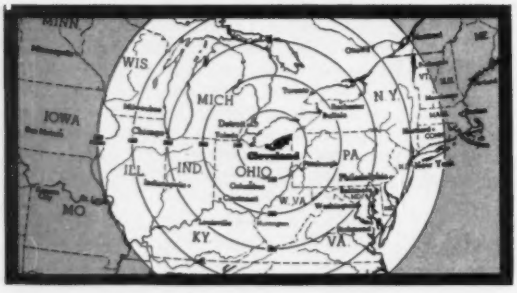

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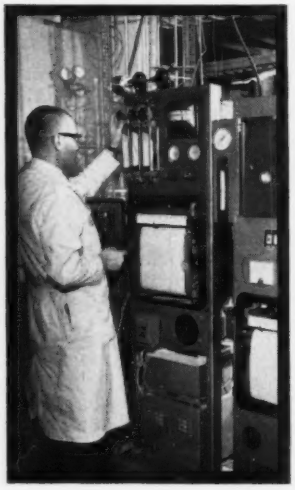

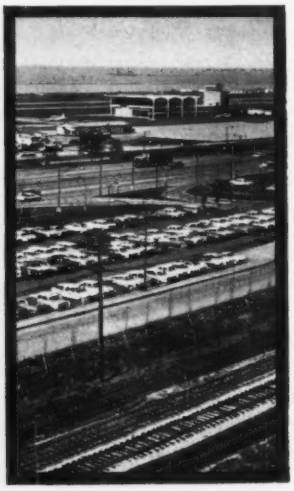

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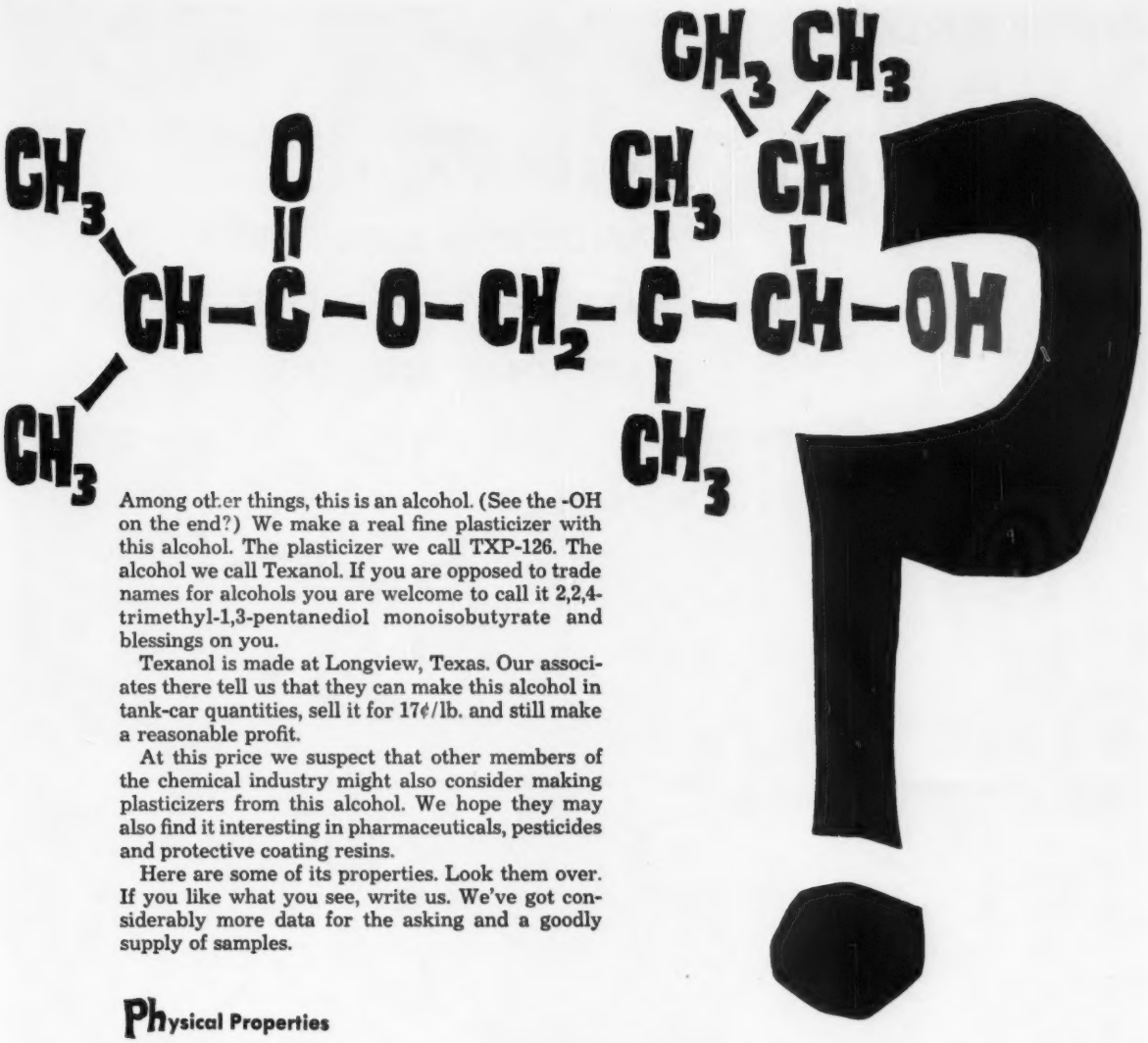

Among other things, this is an alcohol. (See the -OH on the end?) We make a real fine plasticizer with this alcohol. The plasticizer we call TXP-126. The alcohol we call Texanol. If you are opposed to trade names for alcohols you are welcome to call it 2,2,4-trimethyl-1,3-pentanediol monoisobutyrate and blessings on you.

Texanol is made at Longview, Texas. Our associates there tell us that they can make this alcohol in tank-car quantities, sell it for 17¢/lb. and still make a reasonable profit.

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Here are some of its properties. Look them over. If you like what you see, write us. We've got considerably more data for the asking and a goodly supply of samples.

Physical Properties

Color, APHA, max. ppm.	20
Specific gravity, 20/20°C.	0.945-0.955
Acid, as isobutyric acid, max. wt. %	0.2
Water, max. wt. %	0.2
Carbonyl, as C=O, max. wt. %	0.4
Distillation range, 125 mm., °C.	180-182
Flash point, C.O.C., °F.	245
Pour point, °F.	−69
Weight per gallon, 25°C., lb.	7.88
Solubility, 25°C., wt. % in	
Benzene	Miscible
Ethanol (95%)	Miscible
Acetone	Miscible
Carbon tetrachloride	Miscible
Water	Insoluble
Water in	0.9

Texanol

a 12-carbon Eastman ester/alcohol

Eastman

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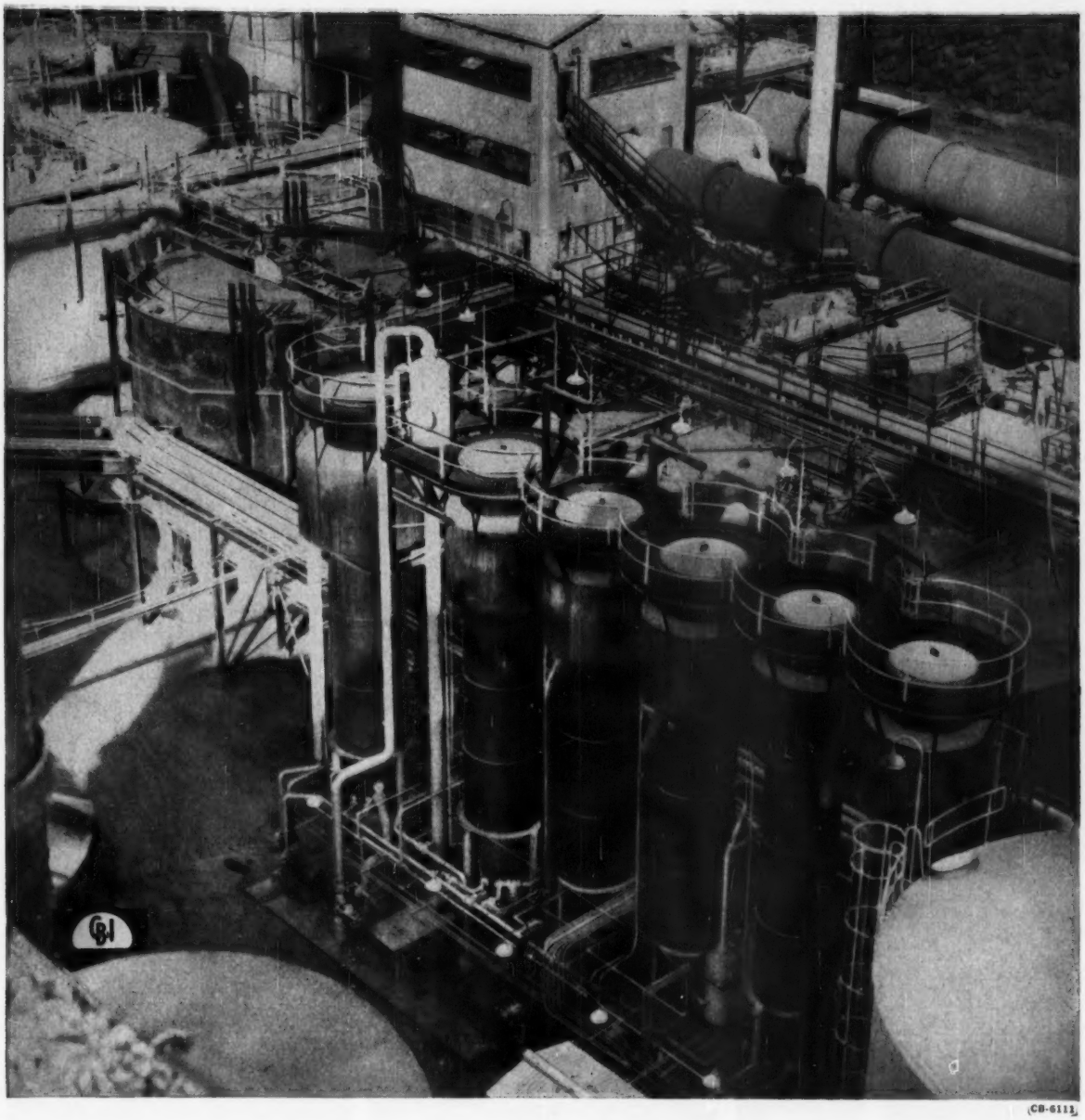

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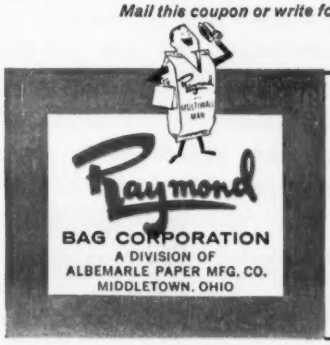

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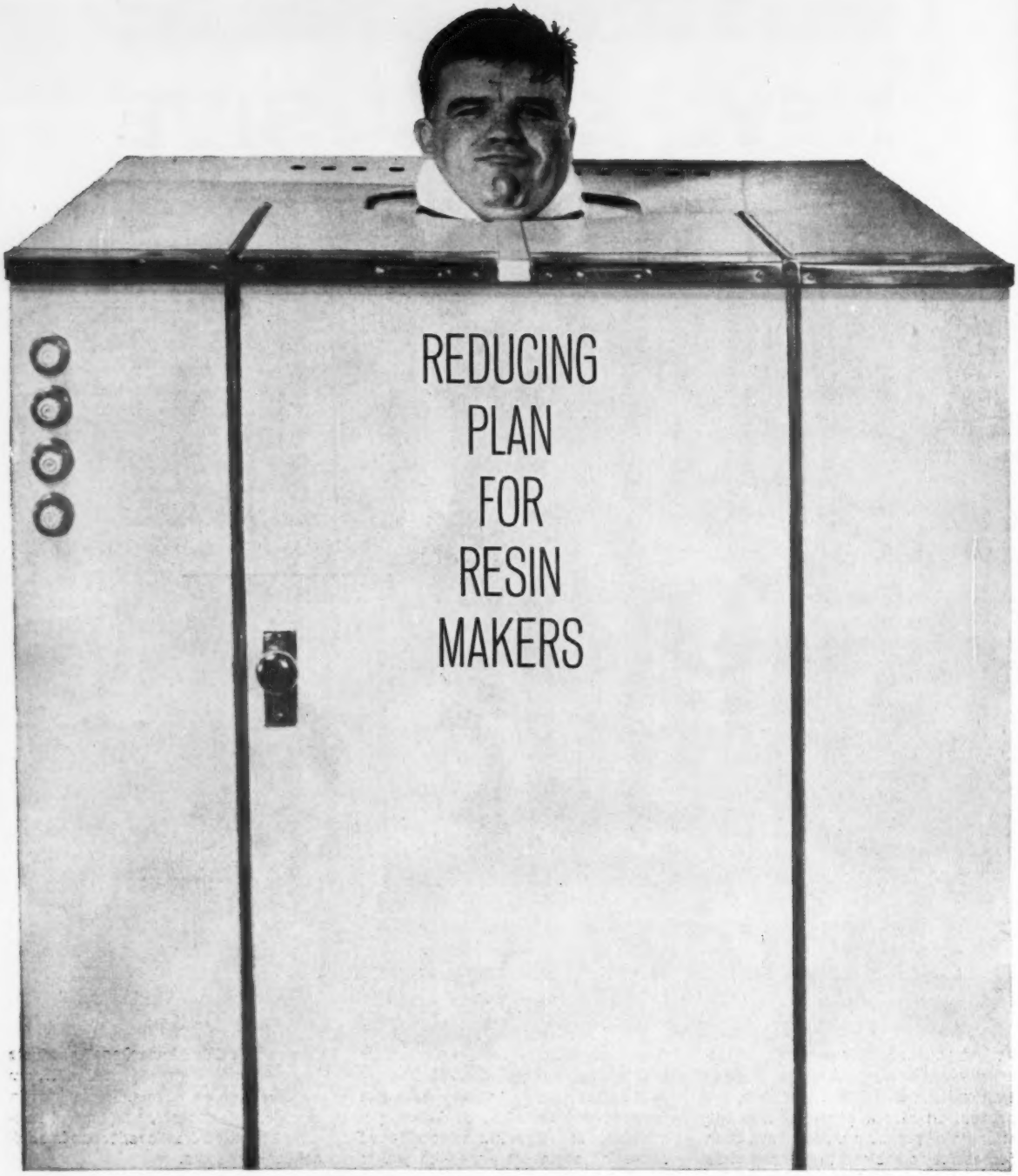

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REDUCE CYCLE TIME, STEAM REQUIREMENTS. Save time and power; stop evaporating tons of unwanted water.

REDUCE HANDLING, STORAGE COSTS. Less material to handle, requires less storage space. Heated tanks are not necessary.

REDUCE KETTLE SIZE. Higher concentration of active ingredients lets you use a smaller kettle or produce bigger batches with existing equipment. • How much can you trim your operating expenses? Our 36-page brochure gives typical economies. Write for it.

For specs and local offices, see Chem. Materials Catalog, page 272A; Chem. Week Buyer's Guide, page 27. 2819

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Business
Newsletter

CHEMICAL WEEK
July 15, 1961

Second-quarter sum-up: Not bad at all. Though most chemical companies' six-month operating data won't be out for another week or so, corporate executives have already made it clear that the upturn that started back in March has been steadily gathering strength right into this month.

In general, it appears that second-quarter sales will be nearly the same as the peak registered in the corresponding period last year; but that earnings—while vastly better than in the first quarter—are still seriously below par.

Two companies already have reported official (though unaudited) figures bearing out those generalizations. For Hooker Chemical: sales up more than 10% from the first-quarter level, but down 1% from the year-ago second quarter, to $38.3 million; earnings up nearly 18% from first-quarter net, but down 9% from second-quarter '60, to $3.1 million. For American Enka: sales up 13.5% from first-quarter '61 and up 16.8% from second-quarter '60, to $25.6 million; earnings up 101% from first-quarter '61 and up 625% from second-quarter '60, to $1.2 million.

Unofficially, Du Pont Treasurer R. Russell Pippin has predicted that his company's second-quarter sales will easily top the first-quarter's $513.3 million and "approximate very closely" the record $561.8 million in last year's second quarter. A Union Carbide official has forecast a definite gain in sales and a possible gain in earnings for his company's second-quarter efforts; and Allied Chemical has confirmed a continuing pickup in sales to all classes of customers through the second quarter. Koppers figures that its second-quarter earnings were more than double those of the preceding period.

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Acrylic products plant for Rotterdam will be the first step in Imperial Chemical Industries' 10-year, $280-million investment program for Continental European (*CW, March 11, p. 25*). The $19.6-million plant will produce "Diakon" acrylic moulding powders, "Perspex" acrylic sheet and methyl methacrylate. It will draw raw materials from within the Common Market. Construction is slated to start this year, with the plant due onstream by the end of '63, By that time, ICI plans to have enlarged its plastics market in Europe through increased exports.

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Petrochemical and plastic expansion plans are popping all over the U.S.

Latest inkling of coming activity in the Chicago area is seen in a remark to *Chemical Week* by Spencer Chemical Chairman C. Y. Thomas. He expects to be able to buy ethylene from one of five prospective sources for Spencer's coming Chicago polyethylene latex plant (*CW Business Newsletter, April 22*). One source will likely be American Oil Co.'s pro-

posed $10-million ethylene/propylene project at either Whiting, Ind., or Joliet, Ill.

Another strong possibility is Sinclair Oil Co., which has a 120,000-bls./day refinery at East Chicago, Ill. Sinclair discussed several joint ventures with American (then Indiana Standard) six years ago. The only deal that went through was a nitrogen project, but among those discussed was an ethylene venture. At that time Sinclair figured it needed at least 1¢/lb. above the Gulf Coast price to make the deal pay. Sinclair says it has no firm ethylene plans now.

Still another possibility is Clark Oil & Refining Co. (Milwaukee), which says it is definitely looking for a petrochemical venture in Chicago. Clark is working with Universal Oil Products on a survey now. Hydeal aromatics are a good long-range prospect; more immediate plans might include cyclohexane materials. The coming plant will not necessarily be located at Clark's Blue Island, Ill., refinery.

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Cary Chemicals has firmer plans now for its polyvinyl chloride projects. The first unit in its 150-million-lbs./year expansion will be a 100-million-lbs./year plant, which will definitely be some place in New Jersey (intrastate freight rates for raw materials are better than interstate, and Cary has its present plant at Flemington, N.J.) This unit is expected to add $18 million/year in sales to Cary's present $12-million/year volume. Another 50-million-lbs./year unit (to add $9 million/year in sales) will eventually be built in the West—probably in the Midwest, but possibly on the Houston Ship Channel, or even on the West Coast. Plans for this plant depend on how and where the market develops, won't be firmed for at least two years.

Goodrich is now conducting engineering studies on its 20-million-lbs./year Long Beach, Calif., PVC plant, which will probably lead to a "substantial" increase in capacity. Goodrich's Cleveland office, however, speaks only of an increase in "efficiency," not capacity.

Du Pont will double the capacity of its Richmond, Va., polyethylene film plant to more than 60 million lbs. year. The plant started operating a year ago, will be twice the original size a year from now.

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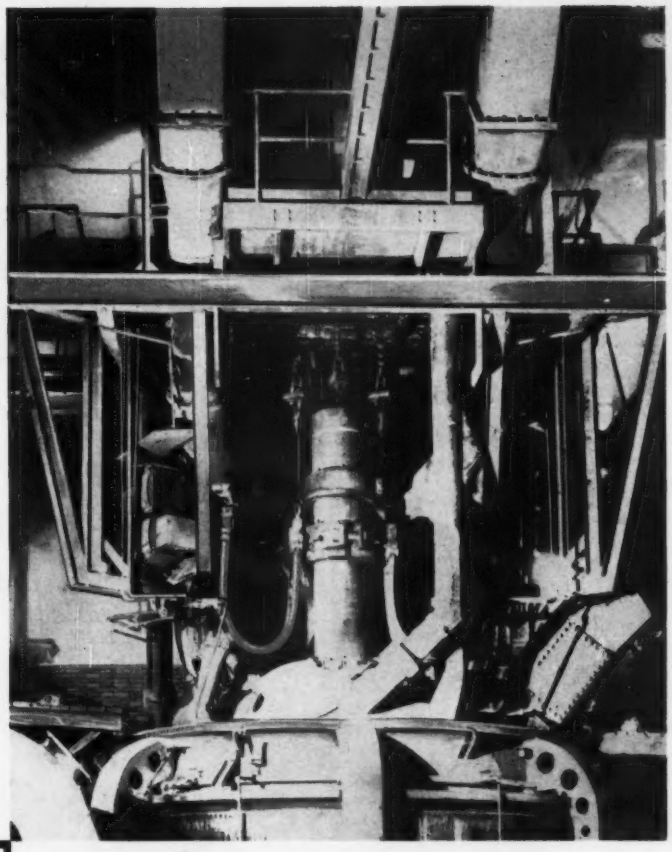
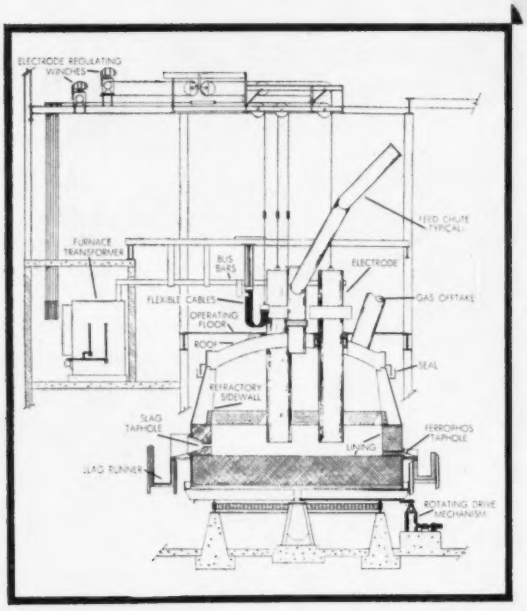
Increasing activity in chemical minerals. FMC Corp. (formerly Food Machinery and Chemical) has taken out an option on 126 mining claims in the beryllium-bearing Spors Mountains area of western Utah; Hooker Chemcal has purchased and leased rights to additional undeveloped phosphate reserves in west-central Tennessee; and minerals-prospecting Leprechaun Mining and Chemical (Las Vegas, Nev.) is trying to develop its findings of potash, lithium, cesium and rubidium in the Clayton Valley of southwest Nevada. FMC's new holdings are south and west of properties held by Vitro Minerals, Combined Metals Reduction and Beryllium Resources. Hooker says it now has assured phosphate reserves "adequate for many years."

ELEMENTAL PHOSPHORUS FURNACE PLANTS





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Carlile Corporation will provide complete pre-engineered process plants, complete plant construction, and consulting engineering services. Use Carlile experience to engineer economy into your existing operations. For a detailed description of Carlile capabilities and documented experience, write for Bulletin 161.

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113

Lamplighters are out now

Gas lamps, candles and lanterns served their purpose... incandescent and fluorescent lamps are doing a fine job... but some of today's newest lights are electroluminescent — and use a Cyanamid acrylonitrile derivative. Modern textiles, synthetic rubber and plastics also use this reactive monomer, and even natural materials can be modified to make new, more desirable products. If acrylonitrile is one of your basic raw materials or if an idea needs help, it makes sense to contact Cyanamid, *headquarters* for acrylonitrile. Our 25 years' experience with this versatile product is yours for the asking. American Cyanamid Company/Petrochemicals Department/ 30 Rockefeller Plaza / New York 20, New York.

CYANAMID

Chemical Week / JULY 15, 1961

For Plastics—A Welcome Home?

There's new encouragement for plastics makers, now trying hard to enlarge their share of construction markets.

The $4.9-billion federal housing measure recently passed by Congress gives special encouragement to plastics makers eager to penetrate the hefty construction market. One section of the new law permits the Federal Housing Administration to insure mortgages on experimental houses incorporating new materials and techniques. Examples: nylon pipe for plumbing, plastic woven wall coverings, particle boards with plastic veneer finishes for floors, walls, cabinets.

For many years plastics makers have anticipated that construction would one day be the biggest single plastic outlet. After all these years, however, most concede that plastics' penetration into the building materials market has been disappointing. Plastics now account for about $450 million/year of domestic construction spending, much less than 1% of the total outlay. President Harry Warner of B. F. Goodrich Chemical estimates that by 1970, the construction market for plastics will be 10-fold larger ($4.5 billion). He believes plastics will account for 20% of the materials used in home construction.

Good Products: On the whole, there is nothing wrong with the plastic products offered to the building industry. There have been a number of bad applications of plastics in building as elsewhere, but there have also been a great many applications where plastics are clearly superior to anything available before.

Nevertheless, Paul Paseler of the Building Officials Conference of America (BOCA) told the recent Annual Plastics Conference, in New York: "The experience of BOCA with plastics . . . is disappointing at best. This is not to say that we have had bad experience with plastics products. Quite to the contrary, our experience has been quite satisfactory with those which we have had opportunity to properly investigate. But I would be less than honest with you if I said everything was quite satisfactory between the building official and the plastics industry."

The problem can be laid at the doorstep of municipal building codes, the officials who administer them, and sellers of plastic building materials. Plastics men contend that too many codes are behind the times and are poorly administered, that plastics are being kept out of construction by force of habit and pressure from suppliers of lumber, masonry and other rival materials. One marketer wryly declares: "Too often the town building inspector is a retired carpenter or plumber. He knows how to nail two boards together and that's all. You can't reach him with a new idea."

Burden of Proof: Building officials counter that any reasonable use of plastics will be permitted under almost any code—old or new. The trouble, they say, is that few marketers bother to supply meaningful and dependable information about their products. The plastics industry, they insist, should have stronger standards, should develop better test methods, and should make some effort to sort and classify its materials before tossing them all on the laps of building officials.

Codes and their administrators are

Ceiling panels and building partitions typify the current construction markets for plastic products.

not the only hurdles standing in the way of increased use of the plastic building materials now available. Architects and contractors have been slow to make the switch from old and familiar materials. Although many express a fascination with the new possibilities, they find it easier and safer to use time-honored materials. And they, too, complain of insufficient information — too many new plastic products coming on the market much too fast to keep up with.

Codes Are Key: Many in the plastics industry today believe that the key to the whole situation lies in modernization of the nation's building codes. Their position: By eliminating codes that insist upon materials other than plastics, altering codes to cope with peculiar plastic problems, official approval of plastics will be speeded, and architects will feel safer in using plastics. In effect, plastics would then be a recognized building material.

For the past 20 years there have been attempts to modernize building codes. The original impetus was not a desire to liberalize the codes, but to tighten them. Two major disasters —the Cocoanut Grove night club fire in Boston in '42, which took 492 lives; and the Hotel Winecoff fire in Atlanta in '46, which took 119 lives —put public pressure on city officials across the country to take a fresh look at dusty building codes. It was soon seen that specifying materials is not enough. The codes must demand certain standards of performance — e.g., a wall must not burn through in less than 20 minutes.

Resistance came—and is still coming—from makers of the various materials that had been specified in the old codes, and from the building trade unions. Against this politically formidable opposition, however, the new codes have made surprisingly fast progress.

A significant victory was won this spring when St. Louis adopted a new code, specifying performance rather than materials. The building trade unions and the masonry industry have long been politically powerful in St. Louis, and the old code required a brick or stone sheathing even against steel panels. Similarly, a new code is now in the works for Philadelphia, a city that had also been extreme in its requirements.

Three Models: The new St. Louis and Philadelphia codes, like most recent changes, are based on one of three "model" codes. These are either adopted directly or modified to meet local needs—or political pressures. Generally, preference for these models varies geographically. Prevailing in the West is the Uniform Building Code, sponsored by the International Conference of Building Officials (Los Angeles). In the South the usual winner is the Southern Standard Building Code, sponsored by the Southern Building Congress (Birmingham, Ala.). In the Northeast and Midwest, the Basic Building Code, sponsored by BOCA (Chicago), is winning out.

Still, only a minority of municipalities have adopted the standardized codes; thousands of towns still have no codes at all. A further important point to remember: most building codes deal mainly with major buildings, where the safety of many people is involved. These codes are relatively easy on residence construction.

Plastics provisions of the three basic codes, as well as of many others, are similar. They're based on work done by the Society of Plastics Industry Code Advisory Committee in '55. (The Southern Standard Building Code plastics section was modified after adoption, due to pressure from makers of other materials; allowable areas for reinforced plastics were reduced 50% across the board).

To secure approval for a specific product, an applicant must submit detailed data on strength and other physical characteristics, plus results (from recognized laboratories) of specified tests. One major source of friction between plastics sellers and building officials has been a tendency on the part of irresponsible vendors to send only a few advertising brochures containing often exaggerated claims to accompany their applications. This, plus a history—which any building official can cite—of conspicuous performance failures of improperly made materials, has tended to give all plastics products a bad name. (One plastics marketer believes the best selling technique is to avoid, if at all possible, use of the word "plastic" in describing his products.)

Under Fire: The required tests are generally concerned with flammability. Since this area is of prime importance to building code administrators, officials will not simply accept a salesman's bland assurance that his material is nonflammable or "fire-retardant." Nor will they accept the assurance of just any laboratory. Many will automatically reject any laboratory name which they have seen used with advertising, for example.

Among the most acceptable laboratories for this work are Underwriters Laboratories (Chicago), Factory Mutual Laboratories (Norwood, Mass.), and Southwest Research Institute (San Antonio, Tex.). One of the tricks of the trade is to know enough acceptable laboratories so test-

Plastics Approved by FHA for Homes

- **Vinyl floor tile.**
- **Polystyrene wall tile.**
- **Glass-fiber-reinforced polyester gutters, downspouts.**
- **Polyethylene film vapor barriers under concrete slabs.**
- **Polystyrene foam for thermal insulation and as lath base for plaster on masonry walls.**
- **Plastic pipe connections from house to street sewer.**
- **Plastic pipe for some uses in water systems.**
- **Plastics of certain types for unexposed flashing.**
- **Plastic shower receptors.**
- **Many acceptable uses for plastic surfaces.**
- **Plastic screens.**
- **Foam polystyrene core for wall sandwich panels.**

ing work can be accomplished in the shortest time; getting test results can take as long as 2½ years, or it can be done in two months. There are still a number of building officials, however, who will accept nothing but Underwriters' results. Underwriters Laboratories, naturally, have the longest waiting list.

Not so important in getting building code approval, but important in reaching the architect—the man who actually nails down the sale—is accelerated wear testing. One reason for architects' reluctance to specify plastics is lack of any real knowledge of how they will hold up in the long run. With the old, established materials, knowledge of durability is virtually instinctive. But a good many plastic products have not yet been commercially available as long as a building is expected to last.

Good and Bad: Already some such products, which looked good when introduced, have given poor results over the long run. A major New York builder, reporting on his experience with plastics, says that many solved real problems—e.g., polyethylene used as ground-slab vapor barriers; vinyl plastic water stops for basements; polysulfide expansion joints; neoprene-latex roofs; vinyl film vapor barriers; and polysulfide glazing compounds.

But he declares that others have been disappointing—e.g., straight vinyl floors; latex terrazzo floors; polyvinyl divider strips for terrazzo; sandwich spandrel panels.

Many plastics producers admit that the profusion of unrelatable brand names is a problem in merchandising their wares to the construction industry, but indicate that heavy use of trademarks—which often do indicate real product differences—is their only defense against cut-throat price war.

The question arises of whether a product can become a commodity, with a big-volume market, and still remain a specialty. At present, plastics applications in construction have been squarely in the specialty class. But if plastics makers are to achieve the construction-market penetration they are talking about, plastics will have to come into the commodity category, go heavily into structural applications (e.g., walls and roofs). One guess as to when this might come: an Allied Chemical plastics specialist predicts entire plastic houses by the '80's.

Growing Via New Link-ups

Two major chemical producers—Montecatini (Milan, Italy) and Virginia-Carolina Chemical (Richmond, Va.)—last week moved to broaden their economic horizons by making new investments beyond their countries' borders.

Montecatini and associated interests acquired a 4% interest in Minerals & Chemicals Philipp Corp. (Menlo Park, N.J.) by purchasing 200,000 shares of the latter's common stock—market value about $5.7 million—from three principal stockholders. Piero Giustiniani, managing director of Montecatini, has been elected to Min & Chem's board of directors; and the two companies say they "intend to work together, here and abroad, on a number of mutually interesting projects."

Virginia-Carolina has obtained a 22% interest in Texas International Sulphur Co. (Houston, Tex.) and its wholly owned operating subsidiary in Mexico, Central Minera, S.A. V-C bought 1 million shares of TIS stock, which had been quoted at between 60¢ and $1 in recent over-the-counter trading. And V-C—which has 17 sulfuric acid plants to supply the heavy acid requirements of its phosphate and fertilizer operations—has agreed to buy large quantities of sulfur from Central Minera over a 10-year period. It also agreed to provide technical and management assistance during the life of that contract.

Familiar Tieup: The Montecatini transaction resembles the recent move by Courtaulds (London) to invest in Koppers Co. (*CW, July 8, p. 21*). In both instances, the European companies decided to invest outside of their subsidiaries already operating in the U.S. Montecatini's principal subsidiary in the U.S. is Chemore Corp. (New York); another is Novamont Corp., which has polypropylene resin and fiber plants under construction near Neal, W. Va.

U-C's new associate, Central Minera, will try to bring its sulfur production up to 500 tons/day at its Texistepec dome mine. It operates this mine under a 20-year contract with Fomento Minera, a mining development organization controlled by the Mexican government. TIS officials told CHEMICAL WEEK that because Central Minera does not hold any sulfur concessions of its own, and simply mines sulfur owned by the Mexican government, it is not affected by that country's new "Mexicanization" law for foreign-owned mining companies (*CW, Feb. 18, p. 34*).

Ultimately, Central Minera hopes to boost output to 1,000 tons/day. Its operating contract includes an option for a 15-year renewal. The company reported last year that the sulfur dome it is working has proved reserves of more than 5 million tons of more than 99%-pure sulfur, with most of the 123,000-acre tract still unexplored.

Following the stock acquisition, three members of V-C's executive staff were elected to the TIS board of directors: Edward R. Adams, vice-president for finance; Douglas W. Laird, vice-president for purchasing; and R. Daniel Smith, general counsel.

Lawsuits for Two

Two New York companies—Air Reduction Co. and Union Carbide—were busy this week preparing answers to $1-million lawsuits filed against them. Airco is being sued by Chemetron Corp. (Chicago); Union Carbide by Hanlon Chemical Co. (Kansas City, Kan.).

Chemetron has charged Airco with intent to induce a breach of a contract between Chemetron and Florida Steel Corp. (Tampa, Fla.). Chemetron, which on March 1 entered into a five-year agreement to supply the steel firm's oxygen needs, asserts that Airco offered to supply oxygen to Florida Steel "at a predatory price." Airco says it supplied oxygen to Florida Steel to allow it to keep its plant operating after it had terminated its relationship with Chemetron.

Hanlon has charged Carbide with breach of confidential relations, unauthorized use of a trade secret, and infringement of the trademark of a Hanlon product for washing and waxing cars. Hanlon says a Carbide salesman was given the information on his promise that it would be held secret and confidential. Union Carbide insists it has done "nothing of which Hanlon can properly complain."

Canada to Keep LPG?

Petrochemical companies in Canada this week seem likely to persuade the Canadian government to keep natural gas liquids (LPG) largely in the province of Alberta. Alberta provides most of the country's petroleum and natural gas, and there have been some proposals to pipeline much of the surplus LPG to outside markets.

In hearings last year on applications for various LPG pipeline projects, two of Canada's leading petrochemical concerns—Canadian Chemical Co. and Canadian Industries Ltd. —objected vigorously to schemes that would either (a) export large quantities of LPG from the province, or (b) bring LPG produced in Alberta to a transfer point not near Edmonton (*CW, Oct. 22, '60, p. 27*).

Final decisions on the various pipeline proposals may still be some months away; but as of now, the chemical companies' viewpoint appears to be prevailing. Alberta's Oil and Gas Conservation Board—which conducted last year's hearings—has just made its report of that tenor to the provincial government.

In the report made public last week, the board recommends approval of individual LPG pipelines proposed by Britamoil, Hudson's Bay, and Royalite; but it urges the government to turn down the projects opposed by Canadian Chemical and CIL. These were the integrated-type gathering systems sponsored by Westalta, Hydrocarbon Pipeline and Provincial Products, and the 1,200-mile Alberta-to-Chicago pipeline advocated by Foothills Pipe Lines (*CW, June 4, '60, p. 21*).

Canadian Chemical and CIL both have petrochemical plants near Edmonton, and they expressed concern about availability of raw materials adequate for "a rapidly expanding petrochemical industry" within the province. The report indicates that the board was much impressed with that point.

Future petrochemical industry development in Alberta, the board says, will probably be "along lines where large quantities of both relatively cheap raw materials and cheap fuel are a basic requirement in a particular petrochemical process to produce chemicals having a high unit value."

CORCO's Casey: Raw materials supplier may turn chemical producer.

Petrochemical Comer

Another oil company — this one based in Puerto Rico—is about to plunge into petrochemicals.

Commonwealth Oil Refining Co. (CORCO) has been investigating various possibilities in the petrochemical field, and "will probably be able to reveal plans in this field within the next couple of months," according to company President Sam H. Casey.

For the past two years, CORCO has been supplying refinery raw materials from its 75,000-bbls./day refinery near Ponce, P.R., to Union Carbide's adjacent ethylene plant, which makes ethylene oxide and ethylene glycol. It is due to supply additional quantities of the same feedstock next year when Carbide completes its 110-million-lbs./year polyethylene plant at that same site.

Petrochemical manufacture isn't the only diversification CORCO is weighing. It's also considering three other growth moves: production of asphalt, construction of a 50-mile pipeline to carry refinery products across the island to the major market area, and expansion of refinery capacity to 95,000 bbls./day. Casey figures that if the present cash flow continues, the company will have $5-8 million/year to invest in Puerto Rico "in lines logically connected with our basic operation." And he points out any such undertaking would qualify under the tax-exemption provisions of Puerto Rico's "Operation Bootstrap" program (*CW, Feb. 18, p. 39*).

UOP: More Expansion

Universal Oil Products Des Plaines, Ill.) is continuing to expand its chemical operations. UOP and its subsidiaries have embarked on a $6.5-million expansion program designed to "enable UOP to realize more fully the benefits of its research and development efforts in specific areas," according to board Chairman M. P. Venema.

Largest chunk of the spending, $4.2 million, will be invested in new plants to be built on company property in Shreveport, La. Among the likely products: a new general-purpose catalyst. (This will have no connection with UOP's Purzaust catalytic auto muffler system.)

Of the remaining $2.3 million, about $1.8 million will be spent to expand manufacturing facilities, build and equip a new engine laboratory building and new plants at UOP's Des Plaines and McCook, Ill., sites.

Universal Oxidation Processes, a Los Angeles subsidiary, will spend about $250,000 to establish laboratory facilities to test the Purzaust auto muffler purification system.

The remaining $250,000 is to be used to construct additional manufacturing facilities at Trubek Labs, UOP's subsidiary in East Rutherford, N. J. Trubek is adding a unit to produce intermediates for a new antiozonant that UOP will manufacture (*CW, June 3, p. 24*).

Researcher Resigns

Minnesota Mining & Mfg. Co. (St. Paul, Minn.) is looking for a new research chief this week following the resignation of Carl E. Barnes. Barnes, 53, had served as vice-president for research and head of the company's central research laboratory.

He reportedly felt that for a growth company, 3M was not making an adequate investment in research. Company President H. P. Buetow denies this, adds that 3M is supporting its research program "more vigorously than ever," and that this year's $25-million research budget is at an all-time high.

Before coming to 3M in 1953, Barnes had been associate director of research for General Aniline & Film and research director for Arnold, Hoffman & Co.

Paper Boom in Brazil

A boom is under way in Brazil's paper and pulp industry, heavily supported by U.S. capital. Powering it: (1) An industry investment program involving upwards of $50 million. (2) A change in Brazil's foreign exchange system which doubles the cost of paper. (3) The development of Brazil's machine industry, which is now capable of supplying necessary equipment on an expanding scale.

Brazil's paper output has grown five-fold in the last 25 years. This year about 60 factories will produce a total of some 560,000 metric tons. But the industry has failed to keep up with demand. Last year Brazil had to import 83,500 metric tons of cellulose and 184,000 tons of newsprint—worth a total of $47 million—chiefly from Canada, the U.S., and the Scandinavian countries. This year it will have to import some 170,000 tons of paper.

More Plants Coming: To help meet the swelling demand, a number of companies are wrapping up or planning expansion programs. Among them:

- Lutcher Celulose e Papel S.A. will build a pulp plant in Parana with the aid of a $4.7-million Inter-American Development Bank loan. Total cost: $13 million.
- Rigesa S.A. Celulose, Papel e Embalagens, partly owned by West Virginia Pulp and Paper, has upped its capital by a third in order to double paper output to 12,500 tons/year by '63. West Virginia's new investment is around $1.7 million.
- Visking do Brasil S.A., owned by Union Carbide, the Visking Co., and the Brazilian Matarazzo group, is installing $1.5-million worth of new machinery to step up production of regenerated cellulose.
- Alcantara S.A. has just completed a cardboard plant outside Rio with an estimated output of 7,200 tons/year.
- Industrias Klabin do Parana, Brazil's largest paper producer, is midway through an expansion program designed to double newsprint output, and is erecting a new plant to turn out 200 tons/day of Kraft paper.
- Industria de Papel e Papelao Rio Claro S.A. is building a $1.5-million paper and cardboard plant at Rio Claro, in Sao Paulo.

National Petro Chemicals' Oman: More integration in plastic bottles.

Bottle Firm Goes Basic

By becoming a partner in a linear polyethylene plant under construction at Houston, Tex., Owens-Illinois Glass Co. (Toledo, O.) has nailed down a basic position for itself in the field of blow-molded bottles. Now, only one major producer of rigid plastic bottles lacks a resin-making affiliate.

Last week, O-I took up a 50% interest in the high-density PE plant that National Distillers and Chemical Corp. has started building on the Houston Ship Channel. This 60-million-lbs./year unit, expected onstream late in '62, will cost an estimated $15 million. To operate this plant, the two parent companies have organized National Petro Chemicals Corp.* as a new joint subsidiary, to be headed by Clifford E. Oman. Oman was formerly assistant to the director of production for National Distillers' U.S. Industrial Chemicals division.

Owens-Illinois is turning out plastic bottles at nine plants, expects to have three more onstream by year-end. Among other principal producers of blow-molded plastic bottles, Plax Corp. is owned 50% by Monsanto Chemical and Imco Container and Royal Mfg. are subsidiaries of Rexall and Celanese, respectively. Only Continental Can is not linked to a resin producer (*CW, March 25, p. 40*).

* This was the name of a company formed in '52 to produce chemicals from LPG at Tuscola, Ill.; it was owned 60% by National Distillers, 40% by Panhandle Eastern Pipe Line Co. That joint subsidiary became wholly owned by National Distillers in '57, and the name has lain dormant since then.

Spain Wants More

Spain's chemical industry is pressing for liberalization of the nation's foreign investment regulations. There are two main objectives: to help cut the foreign exchange bill and to bring new products into the country's limited manufacturing range. The proposal is to do this by attracting more foreign technology and capital.

Reflecting this sentiment, Ignacio Zumarraga Larrea, Director General of the Dow-Unquinesa chemical company, pointed out at his company's annual meeting recently that about 20% of Spain's $811-million import bill is for chemicals. Only by attracting foreign investors "will Spain rid itself of exporting its foreign exchange to pay for foreign-made chemical products," he asserted.

Zumarraga, whose own company is now half-owned by Dow, told his stockholders that foreign capital is "definitely interested" in investing in Spain. Last year, he noted, out of $30 million invested in Spain from abroad, $16 million went into the chemical industry—including the $9 million Dow is putting into Dow-Unquinesa's petrochemical project.

More attractive legislation, he said, would attract still more chemical investments in the future.

German Export Pinch

The West German chemical industry's rapid export growth, rolling up new marks for almost two years, is now slowing down. While chemical exports during the first quarter of last year vaulted 24% over the previous first-quarter, they were up a mere 6% (to $400 million) in the first three months of this year.

Even more significant is the fact that the March figures were up less than 3% ov the March '60 level, and preliminary reports indicate that the decline continued into April.

The Association of the German Chemical Industry attributes the slowdown to three factors: the Deutschmark revaluation last March, harder competition from U.S. exports and competition from new U.S. plants in Europe. It also blames the U.S. policy of tying foreign aid grants to purchases from the U.S., and suggests a similar tie for German development aid.

national roundup

Rounding out the week's domestic news.

Companies

Monsanto Chemical Co. (St. Louis) has combined all of its product development and sales efforts on pulp- and paper-making chemicals within its Organic Chemicals Division. These functions formerly were divided among three operating divisions.

Celanese Corp. of America (New York) has moved its headquarters to 522 Fifth Ave., from 180 Madison, where it had been located for the past 32 years. Celanese will occupy eight floors with more than 200,000 sq.ft. of floor space.

Tennessee Gas Transmission Co. has begun construction of a new 33-story headquarters building in Houston, Tex., to be completed early in '63. The structure will have about 880,000 sq.ft. of office space, some of which will be assigned to Tenneco Chemical, TGT's recently organized subsidiary, whose petrochemical plant is under construction near Houston (*CW, June 24, p. 43*).

Texize Chemicals (Greenville, S.C.) plans to acquire Hood Chemical Co. (Ardmore, Pa.), subject to approval by Hood shareholders, by an exchange of common stock. Texize manufactures and distributes textile and industrial chemicals and commercial, industrial and household cleaning and laundry products; '60 sales exceeded $15 million. Hood, which manufactures household cleaning and laundry products, had about $4.5 million sales last year.

Expansion

Urethane Foam: Nopco Chemical Co. (Newark, N.J.) has purchased a 90,000-sq.ft. building and 18.75 acres of land from Brown Rubber Co. (Lafayette, Ind.), and will install equipment for producing flexible urethane foam by year's end. Capacity has not been fixed as yet, pending further market studies, but it is understood that the new unit will be larger than the 4-million-lbs./year plant Nopco opened in Chattanooga, Tenn., last month. Nopco will market the foam through six Midwestern companies it recently purchased from D & W Clark Corp. of Chicago (*CW, June 10, p. 25*).

Nitrogen Tetroxide: Allied Chemical Corp.'s Nitrogen Division plans to build a nitrogen tetroxide plant at Allied's ammonia facilities in Hopewell, Va. No capacity figures have been given out, but Allied says the new unit will double its output of this rocket fuel oxidizer. Onstream target is late August.

Polybutadiene: Polymer Corp. Ltd. (Sarnia, Ont.) has awarded a contract to Catalytic Construction of Canada, Ltd. (Sarnia) for engineering, procurement and construction of the 20,000-tons/year polybutadiene plant to go up at its Sarnia works (*CW, June 24, p. 44*). The new unit is due onstream some time next year.

Silica: Pennsylvania Glass & Sand Corp. (New York) plans to erect a $1-million silica purification plant at Columbia, S.C.; completion is set for the latter part of this year. Markets for purified silica are the glass, ceramics, electrical, chemical, metallurgical and building industries.

foreign roundup

Rounding out the week's international news.

Antibiotics/Italy: Cyanamid International, division of American Cyanamid (New York), plans to build a $1-million plant near Catania, Sicily, to produce broad-spectrum antibiotics by fermentation.

p-Xylene/West Germany: Standard Oil Co. of California and British Petroleum Co. Ltd. have awarded a contract to the German construction firm Lurgi to build a 15.4-tons/year *p*-xylene plant at Dinslaken, West Germany. The British firm's nearby Ruhr refinery will supply the feedstock. Production is due to start in mid-'62. This project parallels a similar venture in Kent, England; cost of the two plants will be $20 million.

Polystyrene/India: Badische Anilin & Soda Fabrik A.G. (Ludwigshafen, West Germany) and R. A. Cole Private Ltd. (Bombay) have joined in a 50-50 venture to build an expandable polystyrene plant at Thana, near Bombay. Capacity will be 20,000 cu.ft./year of rigid plastic foam made by a BASF process.

Petrochemicals/Kuwait: The government of Kuwait has established the following yearly output figures for its petrochemicals project (*CW, June 10, p. 29*): 31,400 tons of caustic soda, 42,000 tons of polyvinyl chloride, 156,000 tons of urea. Kuwait has also joined with Oronzio de Nora of Italy to form Kuwait Petrochemicals Co., which guarantees to market the country's PVC output for 15 years.

Resins/Japan: Amoco Chemicals Corp. (Chicago) has purchased what it calls "a substantial minority interest" in resins-producing Furukawa Chemical Industries (Tokyo).

Innocent—But Paying

Cutter Laboratories now has battled its way through more than half of the 50-odd lawsuits based on allegedly defective polio vaccine produced by the company. But the latest verdict, if upheld, will exhaust the company's product liability coverage —meaning that any further settlements may have to come out of the company's own pocket.

Several weeks ago, Cutter negotiated an out-of-court settlement with 28 claimants (*CW, June 24, p. 79*); and this, along with two earlier claims decided in court, brought payments to $1.3 million. Then in Los Angeles a jury awarded $675,000 for an 11-year-old boy, who according to the complaint, had contracted polio after having been given an injection of Cutter-made Salk vaccine.

Company attorney Wallace Sedgwick says Cutter will move for a new trial, and if this is denied will appeal to higher courts. Last fall, however, the California state supreme court refused to hear Cutter's appeal from the verdict in the first trial.

So if the latest verdict is allowed to stand, it would bring total payments to claimants to about $2 million—and Cutter has consistently stated that at the time all those lawsuits erupted, it was carrying only that amount of product liability insurance.

Deflation of Claims: Originally, the claimants had demanded an aggregate of more than $12.5 million; but in every case tried or settled up to now, the original claim has been whittled down considerably. For example, one settlement of $189,000 covered the cases of five claimants who originally had brought suits for a total of $1.2 million.

Company President Robert K. Cutter has been warning his stockholders about the possible effects on corporate finances. And he has understandably been dismayed about the precedent being set in the cases that have been tried in court.

"In spite of the fact that this vaccine was a preparation produced under license, regulation, and the exact specifications of the U.S. government, and the jury found that we faithfully followed every safeguard, we are held responsible," he declared. "It seems most unjust. The ultimate impact on our operations is not yet known."

No Negligence Charged: Sedgwick suggests that there might be special significance in the Los Angeles case decided last fortnight because in this action the plaintiffs did not even allege that Cutter had been negligent in producing the vaccine. The case was based entirely on the point of law that has been Cutter's stumbling block in previous cases: that a manufacturer can be held liable for injuries and damages stemming from proper use of a product, regardless of whether he was negligent, if the plaintiff can show that there has been a breach of "implied warranty." In these polio vaccine cases, the California courts have held that Cutter was bound by an "implied warranty" that its vaccine was safe.

Cutter's Cutter: Insurance coverage wiped out by latest liability verdict.

Melvin Belli, San Francisco lawyer who represents the plaintiff in the Los Angeles case and various other claimants against Cutter, criticizes the company for "stalling" and "trying to beat the courts." He told *CW* that he believes Cutter could have settled the entire battery of lawsuits for only $2 million; but that now the company has run through $2 million of insurance coverage, has spent some $500,000 on court and legal expenses, and still has some 20 or more cases pending with claims totalling $3 million.

Inasmuch as Cutter has a net worth of more than $9 million and an earnings potential of more than $1 million/year, the remaining lawsuits are no threat to the company's continued existence. But with last year's earnings off by more than 40% and with quarterly dividends omitted so far this year, it's clear that for now Cutter—as one company spokesman put it—"is in a bind."

KEY CHANGES

Bailey K. Howard and **Frank Markoe, Jr.,** to the board of directors, General Aniline & Film Corp. (New York).

William M. Haile and **Kenneth Rush** to executive vice-presidents, Union Carbide Corp. (New York).

Austin R. Zender to chairman of the executive committee and member of the board of directors; **D. Swing Starring** to the board, National Distillers and Chemical Corp. (New York).

Robert C. Hyatt to director of marketing, Antara Chemicals, division of General Aniline & Film Corp. (New York).

Lewis A. Lapham to the board of directors, Celanese Corp. (New York).

Bart R. van Eck to controller, Food Machinery and Chemical Corp. (San Jose, Calif.).

Donald F. Stauffer to managing director; **Robert W. Edwards** to plant manager, Hercules British Honduras Ltd. (British Honduras).

Jean B. Dumon to president director general, Burgess-Manning International, S.A. (Paris, France) subsidiary of Burgess-Manning Co. (Dallas), makers of silencing and pulsation dampening equipment.

Christian A. Herter, Jr., to Socony Mobil as government relations advisor.

Allan M. Johnson to the board of directors, National Foam System, Inc. (West Chester, Pa.), producer of fire-fighting foam.

Thomas F. Owens to treasurer, National Lead Co. (New York).

Herbert J. Siegel to chairman of the board; **James J. Rochlis** to president, Baldwin-Montrose Chemical Co., Inc. (New York).

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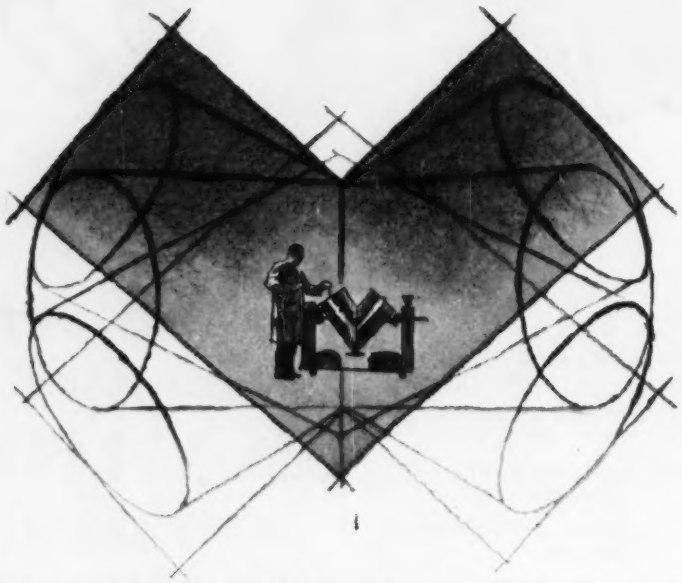

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Projects such as SunOlin's new Claymont, Del., plant are helping to swell CPI's '61 construction totals.

Contractors Show New Strength

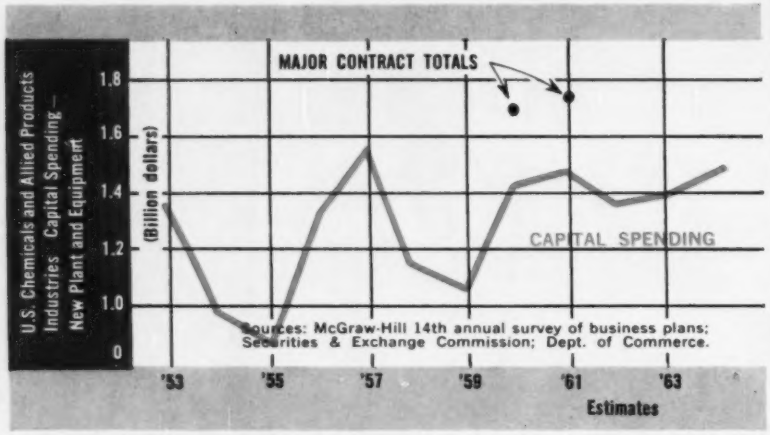
The table (*right*) shows the monthly CPI contract breakdown for the first half of '61, summations of major contracts taken from McGraw-Hill's *Construction Daily*. The January through June total comes to 854 million, a drop from the previous six-month figure, which was $1,110 million (*CW, Jan. 14, '61, p. 21*). The brisk May and June contracting pace, hints that '61 will be a good year—but probably not quite the equal of '60.

This conclusion, however, is based on more than *CD's* contract tabulation. (The full listing of contracts is shown on *pp. 33, 34*). *CW* surveyed 7 major chemical engineering-contractor firms, consulted government and private statistics to help size up the current status and forecast the next six-months for CPI engineering contractors. The sources indicate business

How Much They're Spending for New Plants

Contracts let to U.S. firms for $1 million or more in first-half '61

Plant Type	Jan.	Feb.	March	April	May	June	Total
Basic chemicals	48.8	—	27.1	—	11.5	19.0	106.4
Paper	—	—	—	—	5.0	—	5.0
Petrochemicals	75.0	47.9	—	—	2.0	22.0	146.9
Polymers	—	—	3.0	—	5.0	—	8.0
Refineries	3.8	25.4	—	6.2	25.6	3.0	64.0
Sewage treatment	4.7	1.4	11.1	—	4.5	15.0	36.7
Specialties	12.0	2.0	1.0	2.5	9.5	24.6	51.6
Gases	5.0	7.0	7.5	17.5	2.9	5.5	45.4
Subtotals	149.3	83.7	49.7	26.2	66.0	89.1	464.0
Outside the U.S.	110.0	51.5	59.0	13.5	144.0	12.1	390.1
Totals	259.3	135.2	108.7	39.7	210.0	101.2	854.1



Contract Figures: More Precise Measure

The contract figures listed on *p. 31* have selected from day-to-day listings reported in *Construction Daily*, a McGraw-Hill publication.

Besides a $1-million minimum for the chart, *CW* further limited the list to contracts for plants — excluding those for buildings or laboratories.

Similar Statistics: Other organizations keep tabs on new plant spending. The U.S. Dept. of Commerce, in conjunction with the Securities and Exchange Commission, reports on capital spending. McGraw-Hill's Economics department also surveys plans for capital spending. And many trade and industry associations investigate their particular areas.

But none of these studies peg new plant construction as precisely as do contract figures. Reason: "capital spending," as they survey it, covers virtually every aspect of capital outlay. It includes money spent for buses, furniture and barges, for example, and while these may be categorized as capital goods, they are not tabulated as a contract award. (However, a contract may well include a control building along with the plant).

Another area of discrepancy between the capital spending figures and the data on *p. 31* lies in definition of category. For example, a *CW* story on contract figures (*CW, Jan. 14, '61, p. 21*), prepared in much the same manner as this one, showed a total contract value for 1960 of $1,530 million (exclusive of foreign contracts). The Dept. of Commerce-SEC figure for domestic capital spending in 1960 was $1.6 billion (*see graph above*) which might at first indicate a close correlation.

However, this USDC figure is for chemical and allied industries, and does not include the paper and pulp, food or rubber industries. *CW's* contract figure includes some CPI categories outside the chemical and allied industries, such as refinery jobs.

Timing: Contracts are paid out in portions—so much for every part of the job completed. Thus, a $20-million contract signed in May, 1960 will show up as part of the capital spending figures for '60, '61 and '62.

Equipment manufacturers, using contract estimations to determine how their business will shape up, have to project over a year ahead. That is, it takes from 12-15 months before a contract results in money going to the equipment firms.

Another feature of *CW's* contract statistics: the contracts are usually only estimates. Even in lump-sum deals, the published contract figure will sometimes differ from the actual expenditure for a job. In any case, the contract is only an indication of what the plant will eventually cost.

Point to remember is that these contracts are only indicators. Buttressed by information of other types, and checked out with companies involved, however, they can help make a useful forecast.

at present is not coming in as well as it did in the middle of '60, but it's getting better fast. *CW's* guess: the '61 total major contract volume will hit $1,750 million, just below the '60 figure of $1,770. But a giant spurt in '61 can't be ruled out.

Big League Contract: The charted monthly figures include only contracts over $1 million. The smaller ones are ignored for several reasons: they represent only a small portion of any major contractor's business (many leading engineering contractors do not accept a job for less than $1 million), and for most bulk chemical plants, more than $1 million is required to build an economical plant.

Several major contracts signed during the first half of this year escaped listing, mainly due to careful secrecy on the part of the contractor or his client. But there are not enough of these holdouts to alter the trend very much.

Most of the categories in the chart (*p. 31*) are self-explanatory. One that needs some amplification is "Specialties," which includes contracts for food processing, plus other hard-to-classify contracts by CPI firms. (The article at left explains how the contracts were obtained, shows how these figures tie in with other indicators and projections of industrial growth.)

Foreign Boom: The most significant change in contracts during the past six months is the increase in foreign business, which climbed from $170 million to $390 million. This growth abroad reflects the ambition of European and free Asian nations to expand industrially—at a time when the U.S. economy has not been at full strength.

This trend shows up in the case of refineries: While contracts for U.S. refineries totaled only $64 million these past six months, work on refineries overseas boomed. E.g.: Universal Oil Products (Des Plaines, Ill.) reports that half of its recent licenses have been for refineries outside the U.S. and Canada. A few years ago, the foreign portion was only one-quarter. This trend is almost as strong in chemical process licenses.

Aromatics Take-Off: Petrochemical activity is up. There are over 100 construction jobs under way or planned in the U.S. petrochemical field (several jobs were contracted in '60

(*Text continues on p. 36*)

Culling First-Half's Major Contracts

JAN. '61

Builder	Engineer or Contractor	Date	Cost (million dollars)	Type	Location
Donner-Hanna Coke Corp.	Koppers Co.	1-3	3.0	Fifty coke ovens	Buffalo, N.Y.
Armour Agricultural Chemical	Chemico	1-3	30.0	Phosphoric acid and triple superphosphate	Fort Meade, Fla.
U.S. Office of Saline Water	Catalytic Constr. Co.	1-3	1.5	Saline water	Roswell, N.M.
Champlin Oil & Refining (for Enid Refinery)	Fluor	1-3	1.5	Delayed coker unit	Enid, Okla.
Heyden Newport Chemical	Heyden Newport	1-9	—	Fumaric acid	Garfield, N.J.
Monsanto Chemical	Bechtel	1-9	75.0	Ethylene, benzene, naphthalene	Chocolate Bayou, Tex.
Sid Richardson Carbon Black	Brown & Root	1-9	3.3	Carbon black	Big Spring, Tex.
Organsko Kemijska Industrija	Foster Wheeler	1-12	35.0	Petrochemicals	Zagreb, Yugoslavia
Hercules Powder	Hercules	1-19	—	Polyolefins (polypropylene, polyethylene)	Lake Charles, La.
Youngstown Sheet and Tube	Wilputte Constr. Co.	1-23	6.0	Coke ovens	Youngstown, O. (Brier Hill)
Continental Oil Co. Petroquimica Argentina S.A.	Fish International Corp.	1-23	70.0	Petrochemical (synthetic rubber, benzene, chemicals)	San Lorenzo, Argentina
Du Pont	Du Pont	1-24	5.5	Methanol	Orange, Tex.
Lebanon, Pa.	Daniel J. Keating	1-26	2.1	Sewage treatment	Lebanon, Pa.
American Metal Climax	Missouri Valley Constr.	1-26	7.0	Nitrate of potash, chlorine	Vicksburg, Miss.
Crown Central Petroleum	Tellepsen Constr.	1-26	3.8	Udex for benzene, toluene, oxylenes	Pasadena, Tex.
Southwest Potash Corp. American Metal Climax	Jacobs Engineering Co.	1-26	3.0	Potash	Carlsbad, N.M.
Metropolitan Sewage Dist. (Chicago)	Northern States Co.	1-27	2.6	Sewage disposal	Chicago, Ill.
Bethlehem Steel	Air Reduction	1-30	5.0	Oxygen	Johnstown, Pa.
Imperial Oil Ltd.	Canadian Bechtel	1-30	5.0	Benzene	Sarnia, Ont.

FEB. '61

Celanese Chemical	Brown & Root	2-2	7.5	Petrochemicals	Bay City, Tex.
Marinduque Iron Mines Agents	Foster Wheeler	2-2	23.0	Copper	Mindano, Philippines
Dominion Tar & Chemical	Canadian Badger	2-8	3.5	Phthalic anhydride	Toronto, Ont.
Valley Communities Services of Danville, Calif.	North Bay Canadian Constr.	2-10	1.4	Sewage treatment	Dublin, Calif.
Celanese Chemical	Brown & Root	2-13	4.5	Butylene glycol, polyformaldehyde	Bishop, Tex.
Texaco	Fluor	2-13	2.0	Kerosene hydrotreater	Port Arthur, Tex.
United Carbon	Lummus	2-13	3.0	Carbon black	Valencia, Venezuela
Air Reduction	Rosendahl Corp.	2-14	5.0	Nitrogen and argon	Acton, Mass.
Semet-Solvay	Wilputte	2-14	—	By-product coke ovens	Tonawanda, N.Y.
Republic Steel	Western Precipitation of Joy Mfg. Co.	2-14	2.0	Precipitators	Cleveland, O.
Suntide Refining	Badger	2-14	4.6	Ethylbenzene	Corpus Christi, Tex.
Atlantic Refining	Kellogg	2-14	5.9	Aromatics	Nederland, Tex.
Esso Petroleum Ltd.	Foster Wheeler	2-15	12.0	Butyl rubber	Fawley, England
United Carbon	Lummus	2-16	—	Carbon black	Mojave, Calif.
Air Products	Kerr-McGee	2-17	2.0	Helium	Tucson, Ariz.
Greater Vancouver Sewage & Drainage Dist.	Perini Pacific Ltd.	2-17	4.7	Sewage treatment	Vancouver, B.C.
Metal & Thermit	Metal & Thermit	2-17	1.0	Detinning	Hamilton, Ont.
Goodrich-Gulf	Blaw-Knox	2-20	—	Polybutadiene	Institute, W. Va.
Monochem, Inc.—Borden Chemical	United Engineering	2-24	30.0	Hydrocarbon conversion	Geismar, La.
Puk Sam Chemical Industry Co.	Blaw-Knox	2-24	3.3	PVC, caustic, chlorine	Seoul, Korea
Refineria Conchan-California S.A. Standard Oil (Calif.)	Fluor	2-27	1.0	Crude unit	Conchan, Peru
Humble Oil	Humble Oil	2-28	2.8	Benzene	Baytown, Tex.
Magnolia Petroleum	Kellogg	2-28	16.0	Ethylene	Beaumont, Tex.

MARCH '61

Standard Vacuum Oil	Kellogg	3-1	—	Refinery	Adelaide, Australia
True Temper Corp.	Daniel Constr.	3-2	3.0	Glass fiber	Anderson, S.C.
Govt. of Indonesia	Morrison-Knudsen Inter. H. K. Ferguson Girdler Constr.	3-6	38.0	Urea	Palembang, Sumatra
North American Coal	Interstate Engineers & Constr.	3-17	1.0	Aluminum sulfate from coal mine waste	Powhatan Point, O.
Potash Co. of America	Stearns-Roger Mfg.	3-17	3.5	Potash plant additions	Carlsbad, N.M.
Omaha, Neb.	Hawkins Constr.	3-20	8.8	Sewage treatment	Omaha, Neb.
Atlas Powder	Kellogg	3-22	17.0	Glycerin	Wilmington, Del.
Home Oil Co. Ltd.	Fluor	3-22	4.3	Sulfur extraction	Carstairs, Alta.
Polymer Corp. (SAF) Ltd.	Badger (France)	3-24	12.0	Rubber	Strasbourg, France
Diamond Alkali	C. F. Braun	3-28	5.6	Ammonia	Deer Park, Tex.
El Paso Natural Gas	El Paso	3-28	7.5	LPG extraction	El Paso, Tex.
Dallas, Tex.	Graham Constr. Co.	3-29	2.3	Sewage treatment	Dallas, Tex.
Uaiao Fabril do Azoto	Kellogg	3-29	—	Fertilizer complex	Barra A Barra, Portugal
Shell Oil	Bechtel	3-30	1.0	Asphalt processing	Martinez, Calif.
Greater Vancouver Sewage Dist.	Perini Pacific Ltd.	3-30	4.7	Sewage treatment	Iona Island, Vancouver
Atlas Powder	Atlas Powder	3-31	—	Hydroxyethylcellulose	Hopewell, Va.

First Half's Major Contracts—continued

APRIL '61

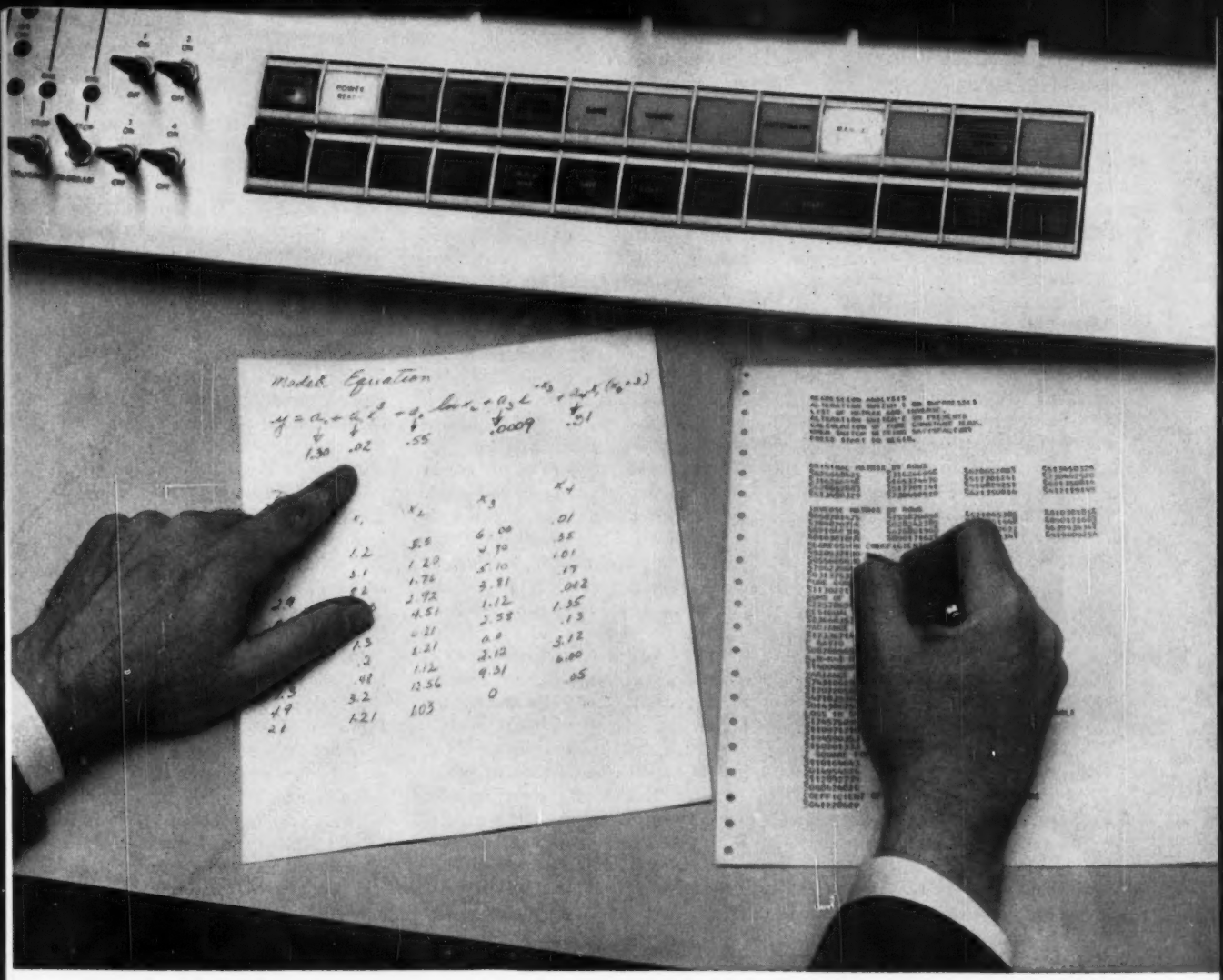
Continental Oil	Continental	4-7	1.2	Propane storage cavern	Ponca City, Okla.
W. R. Grace	Foster Wheeler	4-11	—	Ammonia	Big Spring, Tex.
Standard Oil of Ohio	Parsons	4-12	5.0	Isocracking unit	Toledo, O.
Esso Standard Oil	Parsons	4-19	10.0	Refinery	Managua, Nicaragua
Chemetron Corp.	Dravo Corp.	4-20	17.5	Air separation	Farrell, Pa.
Amoco Chemical Co. & Pittsburgh Coke	Fluor	4-20	—	Isooctyl and decyl alcohols	Portsmouth, O.
Anheuser-Busch	Pfaudler	4-20	2.5	Beer storage	St. Louis, Mo.
Petroleos Mexicanos (Pemex)	Brown & Root	4-21	3.5	Oil storage	Matamoros, Mexico

MAY '61

Interchemical Corp.	Timothy McCarthy	5-1	1.5	Chemical	Charlotte, N.C.
Govt. of Morocco	Dorr Oliver	5-1	—	150,000-tons phosphoric acid	Safi, Morocco
Lurgi (Germany)	Dorr Oliver	5-1	50.0	400,000-tons sulfuric acid	Germany
Krebbs (France)	Dorr Oliver	5-1		200,000 triple super-phosphate	France
Alberta and Saskatchewan	McNamara Const.	5-2	1.7	Processing aggregates	South Saskatchewan
Svenska Esso	Fluor	5-2	15.0	Steam cracking	Stenungsund, Sweden
White Rock Sewage Treatment Plant	Graham	5-3	2.6	Sewage treatment	Dallas, Tex.
Armour & Co.	Darin & Armstrom	5-4	4.5	Edible oil processing	Kankakee, Ill.
Shell Oil	Brown & Root	5-4	1.5	Gas-processing sulfur recovery	Linden, Tex.
Tidewater Oil	Bechtel	5-4	20.0	Isocracking	Martinez, Calif. (Avon)
Du Pont	Du Pont	5-8	4.0	Polyethylene	Orange, Tex.
Carling Brewing	Erickson & Lindstrom	5-9	1.5	Brewing plant addition	Frankenmuth, Mich.
Golden Eagle Co. of Panama	Arthur G. McKee	5-9	50.0	Refinery, petrochemicals	Portobelo, Panama
Humble Oil	Humble Oil	5-10	1.9	Desulfurization addition	Baytown, Tex.
Carstairs (Alberta)	Fluor	5-10	3.0	Gas processing plant	Carstairs, Alta.
Nopco Chemical	Johansen Co.	5-12	7.0	Isocyanates	Linden, N.J.
—	Fluor-Schuytvlot	5-16	2.0	Gas purification, sulfur recovery	Duasts, W. Germany
Iapahan (Iran)	Vered Engineering	5-16	1.3	Sewage system	Iapahan, Iran
Glidden Co.	Whiting Turner	5-18	1.0	Processing and paintmaking	Lakehurst, N.J.
British Petroleum Ltd.	John Brown Ltd.	5-18	15.8	Oil processing	Kwinana, Australia
Spencer Chemical	Quaker Valley Constr. a subsidiary	5-19	1.0	Polyethylene latex	Calumet City, Ill.
El Paso Natural Gas	El Paso Natural Gas	5-23	1.4	Purification and dehydration	Odessa, Tex.
Consolidated Dairy Products	Straith & Co.	5-24	2.5	Milk and ice cream	Seattle, Wash.
The Goliad Corp.	Olsen Co.	5-26	1.3	Propane recovery	Sheridan, Tex.
Columbian Carbon	Ford, Bacon & Davis	5-29	2.0	Carbon black additions	Franklin, La.
Suntide Refining	Parsons	5-29	2.0	p-xylene petrochemicals	Corpus Christi, Tex.
Federal Board Paper Co.	Megin, Inc.	5-31	5.0	Paper mill and power	Versailles, Conn.
Pontiac, Mich.	Mosher Constr.	5-31	1.9	Sewage treatment	Pontiac, Mich.
Humble Oil	Humble Oil	5-31	2.4	Toluene expansion	Baytown, Tex.
Du Pont	Du Pont	5-31	1.0	Methanol expansion	Orange, Tex.
Ottawa, Canada	Jones Constr.	5-31	3.7	Sewage treatment	Ottawa, Ont.
Polymer Corp. Ltd.	Fluor Ltd.	5-31	1.5	Butadiene extraction	Sarnia, Ont.

JUNE '61

Maslite, Inc.	McDowell	6-6	1.6	Sintering process	Plainville, Mass.
Houston Chemical Corp.	Singmaster & Breyer	6-6	10.0	TEL, TML, ethylene oxide	Beaumont, Tex.
White Haven, Pa.	Boyd Klein	6-2	4.1	Sewage treatment	White Haven, Pa.
Cory Brothers & Co. Ltd.	Turiff Constr. Co.	6-7	3.5	Oil tanks, equipment	Purfleet, England
Atomic Energy Commission	Allis Chalmers	6-8	10.8	Boiling water reactor	Genoa, Wis.
Wabash Iron Co. Ltd.	Henry J. Kaiser	6-9	—	Beneficiating	Wabash Lake, Labrador
The Pillsbury Co.	Johnson, Drake & Piper	6-12	2.2	Food processing	Denison, Tex.
Northwest Cooperative Mills	Austin Co.	6-14	4.0	Fertilizer	So. St. Paul, Minn.
Mason City, Ia.	Wilson & Taurides	6-15	1.5	Sewage disposal	Mason City, Ia.
Hercules Powder	Hercules Powder	6-15	—	50,000-tons/year ammonium nitrate	Louisiana, Mo.
Hershey Chocolate Corp.	H. J. McFarland Constr.	6-15	7.0	Chocolate	Hershey, Pa.
Borden Chemical	United Engineering	6-16	15.0	Methanol, vinyl acetate monomer	Geismar, La.
Tenneco Chemical	Kellogg Co.	6-19	12.0	Petrochemical	Houston, Tex.
Amoco Chemical	Bechtel	6-19	—	Resin	Texas City, Tex.
Chattanooga, Tenn.	Sullivan, Long & Hagerty	6-20	2.2	Sewage treatment	Chattanooga, Tenn.
Tenneco Chemical	Hydrocarbon Research	6-20	2.5	Oxygen production	Houston, Tex.
Petroleo Brasilerio S.A.	Hudson Engineering	6-20	5.5	Natural gas processing	Bahia, Brazil
Grange Chemicals Ltd.	Badger	6-21	—	Phthalic anhydride	Hull, England
Organic Chemical Indus.	Compagnia Technia Industria Petroli, S.p.A.	6-21	3.1	Petrochemicals	Suez, Egypt
Philadelphia, Pa.	Malan Constr.	6-22	7.2	Filter plant rehabilitation	Philadelphia, Pa.
Du Pont	Du Pont	6-28	3.0	Vinyl fluoride chemical plant	Louisville, Ky.
Humble Oil	Humble Oil	6-28	3.0	Butyl rubber additions	Baytown, Tex.
Linde Corp.	Heller-Murray Co.	6-30	3.0	280 tpd oxygen plant	Youngstown, O. (Campbell)



Want to find the coefficients? It's easy with the new Regression Analysis program for the IBM 1620

Here's another program offered free-of-charge to users of the IBM 1620 Data Processing System. It gives you the kind of results you might expect only from a much more expensive computer. But users of the 1620 know that its low rental cost is deceptive. The 1620 packs *more computing power per cubic inch* than any other computer in its size range.

The Regression Analysis program is a good example. Suppose you want a fit for production purposes. If you employ more than two variables you probably have difficulty visualizing the representation of your data. If linearity is not the case, you must often guess blindly at a polynomial of high degree, accept or reject the fit with something approaching a sixth sense, and either try again or settle for the results you have.

The new Regression Analysis program lets you handle expressions containing up to *24 variables*. If you have the even more complicated task of handling many dependent variables, the program will generate regression coefficients with a maximum number of dependent variables not exceeding one-half the number of independent variables.

This program will also fit non-linear functions and hyper-surfaces. Compare this performance with that of any other computer in the 1620's price range.

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(Text continued from p. 32)
or are not signed yet). Facilities for manufacturing benzene and petronaphthalene head the list. Olefins and polyolefins are in second place. And ammonia expansions are still in vogue.

Polymers Sag: The dollar volume of contracts for polymer plants has gone down. However, proprietary know-how and thus utmost secrecy is one of the rules in the polymer business. Consequently, even though the overall CPI trend is to fewer owner-built plants and more work for contractors, this rule doesn't hold when it comes to polymer plants. Case in point: Montecatini, now building a 25-million-lb./yr. polypropylene plant (Neal, W. Va.), is its own prime contractor.

A company will occasionally subcontract the job in many small pieces. Consequently, no one contractor gets his hands on a significant portion of the know-how.

Besides the fact that polymer plants may well be owner-built, there is another reason why so few contracts for them were signed so far this year: so many—a whopping $139 million worth—were signed during the previous six-month period. These plants will yield some formidable capacities, and producers have been taking it easy. But with the demand for polymers continuously increasing, a new contract surge in polymers can't be ruled out for the up-coming months.

Sewage Treatment: This category is new to the semi-annual CHEMICAL WEEK contract survey. Even though contracts for sewage treatment plants are relatively small (several of them were omitted from the survey as less than $1-million jobs), the field is growing fast. Moreover, it could provide some new markets for chemicals, such as polyvinyl chloride, which is used in trickle filters *(CW, June, 17, p. 68).*

An expanded program—in fact a doubling—of federal aid for municipal sewage disposal units is almost certain. The House of Representatives authorized a $1-billion, 10-year program for construction grants *(CW, June 10, p. 44)*. And the Senate is cutting this back only slightly; its bill calls for $440 million over the next five years. The present upper limit of the federal program is $50-million-/year.

Today, most sewage treatment jobs are done by relatively small local contractors since sewage disposal is usually a municipal affair. But it's becoming big business and likely to require big contractors, offers an attractive market to CPI equipment makers.

Gases Grow: Gases are a booming field. Oxygen plants are in demand for steel and chemical applications *(CW, Apr. 15, p. 50)*. Hydrogen plants are needed to meet the growing needs of hydrodealkylation units *(CW, Mar. 4, p. 46)* and they will be used for hydrocracking (*CW, Apr. 29, p. 33*).

Eight industrial gases plants are in the tabulation and others are planned. Information on the latter, however, is not available. No matter what the precise statistics, though, builders of industrial gas plants are busy—and the chances are that they will be busier still.

Private Word: Aside from the *Construction Daily* extracts, word from the big contractors helps clarify the trends.

- Bechtel (San Francisco): First half of '61 was better than expected, although Bechtel isn't giving specific figures. And the second half is expected to be equally good.
- Brown & Root (Houston): The first half turned up new contracts for $9.2 million worth of petrochemical plants and $19.4 million worth of chemical jobs. No comment on the outlook.
- Chemico (New York): This company had a "tremendous" first-half of '61. New billings were $55 million—one-third more than for all of '60. With the continuing demand for ammonia-fertilizer plants, which are usually substantial contracts, Chemico hopes to keep up its boom. 40% of the business is foreign and this is a growing area.
- Fish Engineering (Houston): New CPI contracts for the first half totaled $19 million. The firm predicts a volume of $70 million for the second half, 70% in work outside the U.S.
- Foster Wheeler (New York): This firm did about $170 million in first half billings, not all of it in the CPI. About 50% of this was for overseas business. Forecast: a second half comparable with the first half.
- Lummus (New York): The total installed cost value of contracts awarded to the Lummus group in the first half of '61 was $60 million. This was 84% of forecast. The firm expects $90 million in the second half. Some 92% of the first half's business was in foreign projects.
- Parsons (Los Angeles): This West Coast firm predicts a slight rise for the second half, $230 million this past half up to $235 million. About 15% is foreign.

Over-All Scene: CPI firms, in placing new contracts, are naturally anticipating general business conditions, because money contracted to be spent does not leave a corporation's coffers for many months.

At present, chemical producers are optimistic. February was a low point for chemical production and since then output has climbed from 70% to about 78% of capacity. Sales of chemicals added up to $93.6 billion last year and the predictions are for $96.4 billion this year (*CW, June 24, p. 114*).

In fact, preliminary figures show May to be the highest month for chemical sales ever recorded *(CW, July 8, p. 17).*

Although the latest forecasts for capital spending show a drop of 3% for all manufacturing industries in '61, they predict a gain of 3% ($6.15-$6.31 billion) for the CPI. *(CW, June 17, p. 24)*. Capital spending for chemicals alone, with the rest of the CPI omitted is as shown on *p. 32*. A survey by the Manufacturing Chemists' Assn. estimates expenditures for new construction and modernization this year at $500 million, a 5% increase.

The longer-term trend is optimistic. The 1962 Gross National Product (the total output of all national goods and services) is forecasted as 8% above this year; and it should go hand in hand with an investment boom.

New Factor: A plan for a 7% across-the-board tax credit on new plants and equipment is gaining favor in Washington, in both the Treasury and the House Ways & Means Committee (*CW, June 24, p. 67*). There are still a number of hurdles to be cleared before the credit plan reaches Congress. But there is a reasonable chance that it, or something like it, will become law.

If it does, it will be a major spure to contractors and equipment manufacturers. Most predictions will have to be revised upward in such event.

But in any case, the engineering contracting business looks good now—and boom time may be on the horizon.

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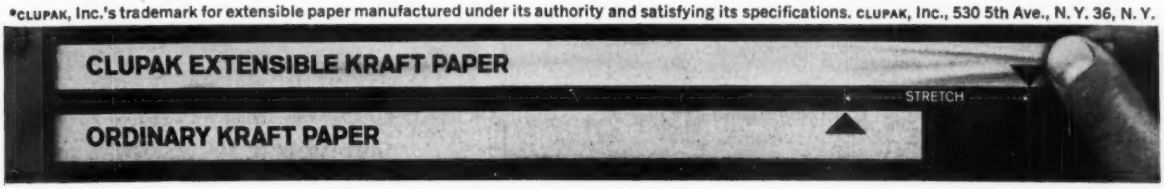

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Sen. Smathers (left), TAA's Baker lead fight in government and industry against illicit truckers.

Bearing Down on Bogus 'For-Hire' Truckers

Two new investigations into the decline of common carrier transportation point up the threat posed by illegal trucking. The studies, done by the Senate Surface Transportation Subcommittee, raise the specter of higher freight rates. Reason: illicit operators are walking off with the high-profit, easy-to-move cargoes; a growing share of legitimate truckers' business is devoted to more demanding —and more costly—jobs.

And some chemical traffic men fear that private transportation may be drawn under government regulation as a result of ICC's moves to suppress illegal shipping.

Hopefully, more acceptable ways to curb illegal trucking will be proposed by other groups studying the problem. The regular common carriers conference of the American Trucking Assn. has set up an investigating staff of its own and has filed numerous complaints the past few months against shady operators. And the Transportation Assn. of America (TAA) has organized a cooperative effort among carriers, shippers, state and federal agencies to tackle this problem.

Types of Operations: The most prevalent violator of ICC regulations is the illicit "for-hire" trucker. Although private trucking by a manufacturer is exempt from ICC regulation, shipping for the producer by a trucking firm amounts to for-hire carriage which must be ICC-licensed to be legal. Shippers can legally use leased equipment as long as it is under sole control. But if both truck and driver are leased and operated without ICC authority, the courts have ruled that this is illegal for-hire trucking.

The main impact of illegal trucking operations hits the chemical industry through increased common carrier rates. And shippers who resort to illegal trucking only compound the problem. Producers who move their output by cut-rate, clandestine truckers can gain immediate price advantages. On return hauls the gypsy resellers or unauthorized carriers can offer rates one-fourth to one-half those of ICC-authorized common carriers.

CPI Products: ICC data on illegal trucking is sketchy at best, but agricultural chemicals (fertilizers, pesticides and insecticides) are among the CPI products most often handled by illegal truck operators—usually in the back hauls of trucks supposedly restricted to movement of farm products. Fertilizers have also been found moving under illicit "buy-and-sell" arrangements. Here the trucker buys the products at the plant and resells them to customers along the way, usually at the buying price plus an amount for transportation.

Scattered instances have also been reported of "buy-and-sell" movements of crude oil, butane, propane and liquefied petroleum gas, salt and sugar. Generally, most offers to haul commodities outside ICC authority are for chemicals that require little

Carbide's Beard: Keep public carriers as strong as possible.

or no special handling precautions.

Hard to Control: "The primary obstacle to elimination of these shady operators is our lack of control over customers' trucks," says one chemical traffic manager. "If a truck comes into the plant with the buyer's name printed on it, the producer has little choice but to load the cargo as directed."

To avoid loading trucks that the customer has hired illegally, most chemical firms' receiving and shipping departments employ a number of checks. These measures seek to determine the trucker's authenticity. But, by and large, chemical makers are hesitant about putting in rigid restrictions on customers' trucks. In the present buyers market, sellers are particularly reluctant about questioning the legality of customers' shipping operations.

Organized Studies: The transportation subcommittee, headed by Senator George Smathers (D. Fla.), has already held two hearings this year, in early March and in late June. At the start, Senator Smathers declared that the "factors responsible for the decline of the nation's essential common carrier industry constitute our most critical transportation problem."

The subcommittee's three-pronged mission: to determine the causes and extent of the relative decline of regulated carriers; to determine the reasons for the rapid growth of unregulated private carriers; and to evaluate the resulting effect on the adequacy of the national transportation system.

As the hearings progressed, the magnitude of the problem became clear. Illegitimate trucking operations are estimated by the ICC at 11.2 billion ton miles/year, some 4.5% of total intercity ton-miles of for-hire and private trucking.

Methods of halting this traffic also were examined. At the first meeting, TAA President George Baker suggested that illicit for-hire carriage could be curbed "through better enforcement." Senator Smathers proposed that Congress provide jail sentences for those engaged in illegal trucking. They are now subject to fine, but Smathers feels the fines are looked upon merely as nuisance business expenses.

At the latest Senate hearings, Union Carbide's general traffic manager, Charles Beard—speaking as a director of TAA—emphasized the need for keeping the over-all public carrier system as strong as possible. One of his proposals has a direct effect on chemical firms doing business with the government. He urged that "governmental preference be given regulated carriers in the procurement of for-hire transportation, whenever reasonably available, including for-hire transportation procured by contractors in direct connection with government contracts."

In the meantime, the TAA has set up an *ad hoc* group, the Committee Against Unauthorized Transportation (CAUT), with three major objectives:

(1) Public education on the economic dangers of illegal trucking.

(2) Broader enforcement of existing laws.

(3) Ways to make enforcement efforts more effective—including jail sentences for offenders, in addition to the fines.

CAUT is inviting trucking, railroad, shipping and other industrial organizations to particpate in its campaign. So far, CPI representatives haven't enlisted. And the Manufacturing Chemists' Assn. is leaving any moves against illicit truckers up to individual companies.

Mixed Future: Carriers can do a good deal to help themselves in this battle. An ICC spokesman has pointed out that common carriers could knock out some illicit competition by providing more efficient and economical service.

"Truly coordinated transportation now appears to be inevitable," he says. "The inherent efficiency and economy to be found in coordination and containerization continue to be demonstrated by 'piggy-back,' 'fishy-back' and 'fly-away' movements. Each step that is taken toward truly efficient service at reasonable costs will lessen the inducement to the shipper to become involved in under-the-counter transportation agreements."

On the other hand, if illicit hauling continues to expand, the government itself may step in. And the CPI has no great desire for more government regulation. Even now in some cases, the ICC is holding shippers and the offending carriers equally responsible for breaches of the law. To close any legal loopholes, some groups have recommended elimination of all ICC exemptions and exclusions from control now provided for agricultural commodities and non-profit shipping co-ops.

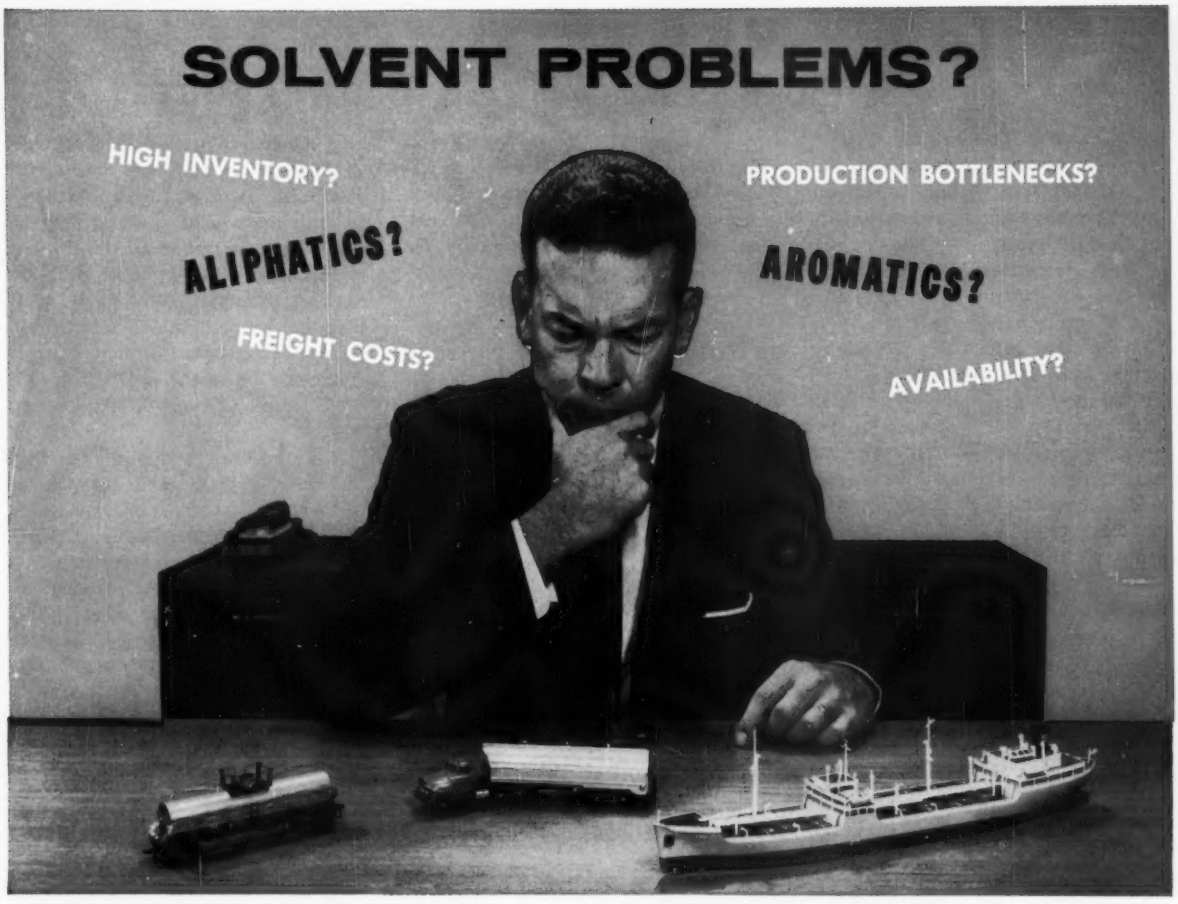
Both shippers and carriers talk staunchly of self-policing and self-improvement as weapons against illicit trucking. But as the problem draws increased public and government attention, more stringent controls become more likely.

Probing Sales Salaries

A fresh look at chemical and drug salesmen's salaries has just been compiled by the Drug, Chemical and Allied Trades Assn., a section of the New York Board of Trade.

DCAT gleaned its information from a survey of 270 member companies, of which 150 are New York-area firms. Chemical and drug marketers were about equally represented (slightly over 40% of the total for each) with packaging and other firms making up the balance of the sample.

According to the survey, New York-area sales staffers earn about $600/year more than their counterparts in other parts of the country—$9,263/year (median) vs $8,603. The national median for all companies polled was $8,955. The greatest concentration occurs in the $7,500-10,000 range, where more than 50% of the respondent com-



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panies place their average salesmen's pay.

One quarter of the firms say their average salesmen's compensation is $10-15,000/year, while a slightly smaller group indicate average salaries of $5-7,500/year.

Cash Incentives: The respondents were about equally divided on their use of special incentives. But of those that do offer extra sales-boosting rewards, cash was mentioned by 96% as the most common and by 80% as the most effective. Merchandise and travel were listed next in both categories. Most firms queried say they use sales over quota as the basis for offering extra incentives.

Some 36% of the firms pay their sales staffers straight salary, while 29% use a salary plus bonus, and 27% pay salary and commission. Another 20% use still other compensation plans (*CW, Oct. 1, '60, p. 83*).

In response to DCAT's question on benefits that they provide for their salesmen, companies' answers stacked up this way: hospitalization—87%; major medical coverage—72%; life insurance—83%; accident and health insurance—67%; and pension plans —67%. Only 1% of the firms include their sales staffers in on profit sharing plans, however.

Other Aspects: Besides shedding some light on salesmen's compensation, the survey reveals some other interesting data about chemical sales management.

Three-quarters of the sales staffers covered by the survey are 30-50 years old; only 1% are younger and 4% older. More than 60% of the firms say they have no age limit for salesmen, while 26% say age 65 is the retirement age for sales staffers.

Over half the firms hire sales trainees; training for new sales staffers is 3-6 months (18%) to 6-12 months (33%) and more than a year for a substantial number (33%) of firms. Starting salaries for trainees was pegged at $400-550/month, with N.Y.-based firms tending to pay slightly more. Median starting pay for trainees: $467/month.

The survey also brought out the differences in sales accounts handled by DCAT members. Some 70% of the N.Y.-area firms say they sell mainly to manufacturers, 28% to wholesalers. Out-of-town firms consider the two groups virtually even as customers.

Rails Win Rate Case

The chemical process industries stand to gain both lower transportation costs and better service from the Interstate Commerce Commission's recent decision upholding the railroads' right to set low "piggyback" rates for special types of hauls (CW Washington Newsletter, July 8).

In the decision, the Commission upheld the railroads' right to set "piggyback" traffic rates lower than most truck rates. The truckers, led by the American Trucking Assn., thus lose this round of the hard-fought issue, but are expected to contest the ICC decision, perhaps take it to the courts.

CPI Hand: The chemical industry, which stands to gain much from the decision, has also been instrumental in winning the ICC's approval. The Manufacturing Chemists' Assn., spearheaded by Union Carbide, Monsanto, Merck, Rohm & Haas and Mallinckrodt, vigorously supported the rails' bid.

Behind their move: strong threats by some CPI firms to enter private carriage in a greatly expanded way. It's no secret that several chemical producers have given serious thought to expanding their private truck fleets to offset the rising traffic costs. The new, low "piggyback" rates were the railroads' attempt to win back traffic and deter chemical shippers from further expansions into private trucking.

As a result of the decision, railroads are planning major expansions of piggy-back service.

Cerro: Selling Its Own

Cerro Sales Corp., a subsidiary of Cerro Corp., is now handling all of its own sales operations. Early this month, the firm terminated a long-standing sales agreement with American Metal Climax, Inc., in which Amax marketed Cerro's copper, lead, zinc, zinc concentrates and silver.

Cerro will consolidate sales efforts for these materials—in addition to its antimony, cadmium, selenium and tellurium sales—in two departments, the Metals, and Alloy Sales.

Main reason for shift, according to Cerro, is the company's rapid growth in sales volume (from under $45 million in '53 to $168 million last year).

DATA DIGEST

• **Alcohols:** New, 80-page booklet describes properties and uses of 21 industrial alcohols, from methanol to tridecanol. Data outlines physical properties; constant-boiling mixtures; specification limits; test methods; storage, handling and shipping; toxicological properties; and selected literature references. Union Carbide Chemicals Co., division of Union Carbide Corp. (270 Park Ave., New York 17).

• **Peroxides:** Technical bulletin outlines properties and applications of eight classes of organic peroxides: diacyl aromatics, diacyl aliphatics, dibasic acid, ketone, aldehyde and alkyl peroxides; alkyl peroxyesters; alkyl hydroperoxides and other special products. Lucidol Division, Wallace & Tiernan Inc. (1740 Military Rd., Buffalo 5, N.Y.).

• **Company Products:** New, 212-page catalog lists specifications and prices of company's line of organic chemicals, spectroquality solvents, biological stains, lab reagents, indicators and inorganic chemicals. Matheson Coleman & Bell, division of The Matheson Co., Inc. (2909 Highland Ave., Norwood, O.).

• **Fire-Retardant Foams:** Brochure (D-300) lists typical properties of rigid, fire-retardant polyurethane foams for use in refrigeration, building, transportation and other fields. Durez Plastics Division, Hooker Chemical Co. (North Tonawanda, N.Y.).

• **Wire Coatings:** Technical report (No. 7) outlines electrical and physical properties of polypropylene formulas developed for solid and cellular wire coatings. Eastman Chemical Products, Inc. (Kingsport, Tenn.).

• **Organic Additives:** Booklet describes use of aliphatic organic chemicals as additives for gasoline, fuel oil, lubricants and asphalt. Typical uses: anti-icers, corrosion inhibitors, emulsifiers and antistripping agents. Armour Industrial Chemical Co. (110 North Wacker Dr., Chicago 6).

• **Plasticizers:** Data sheet (No. 560) outlines specifications, physical properties and performance data for four specialty plasticizers, including formulations and test methods. Chemical Sales Division, Chas. Pfizer & Co., Inc. (235 East 42nd St., New York 17).

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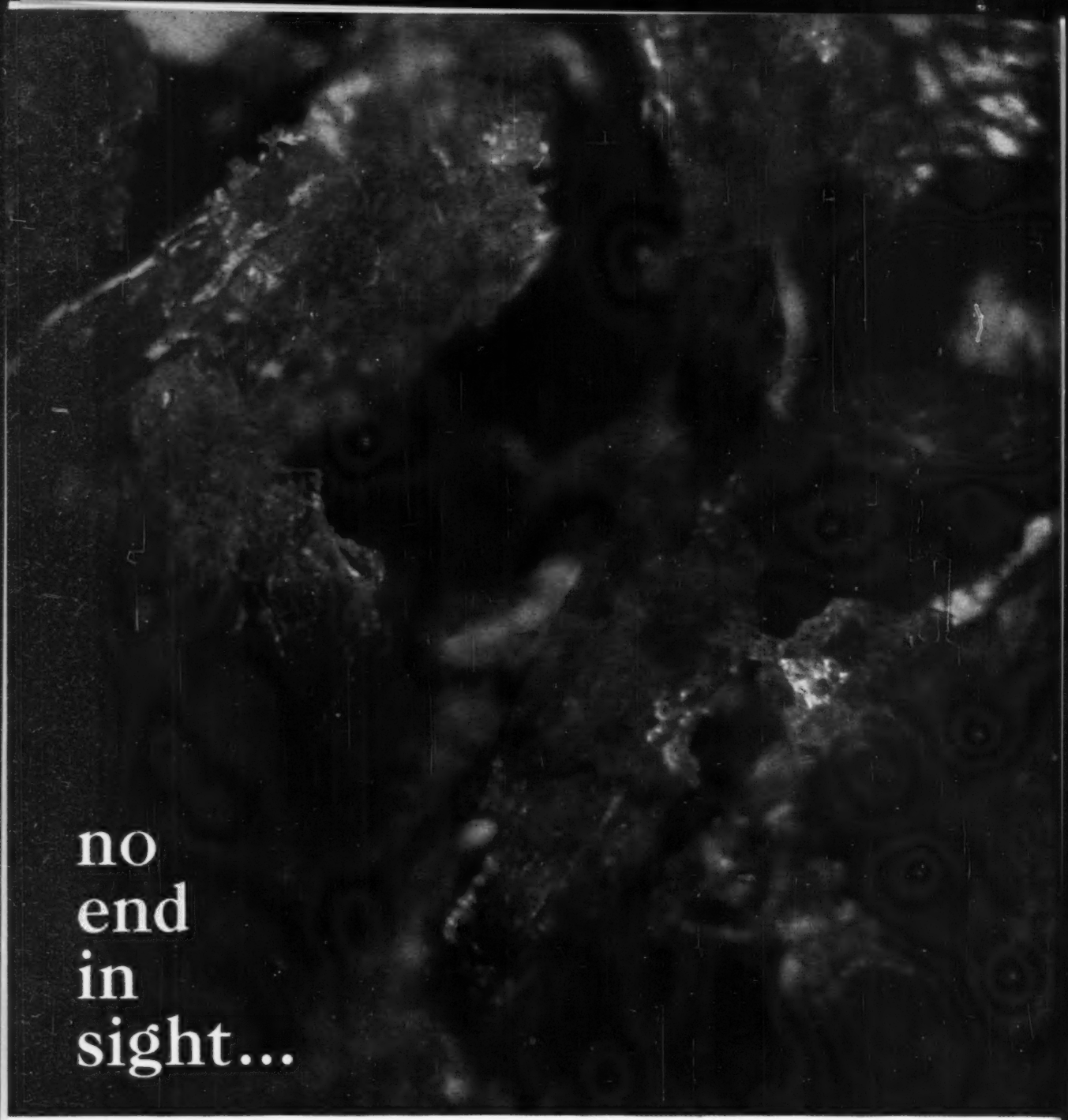

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Photomicrograph of a synthesized chemical made from petroleum

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Washington
Newsletter

CHEMICAL WEEK
July 15, 1961

The Kefauver bill to regulate the ethical drug industry has a long row to hoe in Congress. It certainly will not come to a vote this year, probably not even next. The general feeling is that the Congressional climate is not yet right to impose any such strict controls on a private industry—and Sen. Estes Kefauver (D., Tenn.) knows this better than most men.

That is the reason he plans a long series of hearings, with lengthy intermissions, by his Senate Antitrust and Monopoly Subcommittee. Opposition to the measure is strong and widespread. Kefauver hopes through the hearings to build up public sentiment in its favor—and to swing, via public pressure, Congressional votes to his side.

Opening of the hearings last week did nothing to further this goal. Dr. Hugh H. Hussey Jr., Chairman of the American Medical Assn. Board of Trustees, objected vigorously to provisions of the bill which would: allow the federal government to test a drug's efficacy as well as its safety; force wider use of generic rather than trade names; shorten exclusive patent-right times; and call for federal licensing and inspection of drug manufacturers.

•

Elimination of foreign "tax havens" is now the goal of the Administration. Industry protests—including opposition from the entire chemical industry—forced the Administration to drop its plan to tax overseas earnings of U.S. corporations or their subsidiaries in developed countries immediately rather than wait until the money is returned to this country. The House Ways and Means Committee now is working on an alternative aimed at tax-haven abuses, such as when a company sets up a bookkeeping operation in Switzerland to take advantage of that country's low tax rates.

The Administration also appears to have lost its fight to end the tax credit on dividends. A compromise may yet be worked out under which the tax-withholding system would be applied to dividend payments. And there may be some tightening of expense account deductions. But these would not permit the Treasury to recoup its loss in granting a proposed 8% tax credit on business investment. Thus, the Administration finally may decide to chuck the whole thing and seek a more comprehensive tax reform measure next year.

•

Chemical production and research projects costing $2.5 billion will be built in the U.S. during '61 and '62. This is the latest estimate of the Manufacturing Chemists Assn. Companies whose main activities are non-chemical represent some 30% of the firms reporting investment plans for facilities to produce chemicals and allied products.

The government has estimated $1.73 billion in new plant and

equipment for the chemical industry in '61 (*CW, June 17, p. 24*). The MCA's estimate includes $922 million for organics, $566 million for plastics and resins, $237 million for laboratories, $232 million for miscellaneous chemicals, $225 million for fertilizers, $217 million for synthetic fibers, $100 million for synthetic rubber, $62 million for chemically processed metals.

•

A time extension for obtaining safety clearances for food additives has been granted by the Food and Drug Administration. The time was moved ahead 60 days, to Sept. 1. When President Kennedy signed the new law in April, FDA said previously granted or pending extensions would be continued in effect only until July 1.

FDA said it had a substantial number of requests for the extension on grounds it was not possible to complete the necessary scientific reviews called for under the new law by July 1. Officials note, however, that no extensions can be granted unless the additive involved is shown to present no undue risk to public health during the extension period.

•

The National Agricultural Chemicals Assn. has elected two new members to its board of directors. They are Howard J. Grady, president of the Ortho Division of California Chemical Co., and Daniel J. Keating, vice-president and general manager of the Agricultural Chemicals Division of Stauffer Chemical Co.

•

Chemical process companies rank high on the military list of prime contractors for calendar year 1960. Diversified firms with chemical interests liberally dot the list of 100 top contractors released by the Defense Dept. For example, General Dynamics leads the list with $1.3 billion worth of prime contracts. North American Aviation is third with $964 million. General Electric is fourth with $945 million.

The top 100 defense contractors won 75% of the $21.6-billion in military prime contracts awarded in '60. Here are some other firms with chemical interests, preceded by their order on the list and followed by the total of their awards (in million dollars):

20. General Tire & Rubber (including Aerojet-General)	$257.8	59. Socony Mobil	47.1
27. Thiokol Chemical	140.1	72. Richfield Oil	34.1
30. Hercules Powder	118.8	74. Union Carbide	32.0
36. Standard Oil (Calif.)	96.9	77. Continental Oil	29.9
46. Texaco	74.3	78. B. F. Goodrich	29.9
48. Goodyear Tire & Rubber	64.3	79. Standard Oil (Indiana)	29.5
49. FMC Corp.	62.6	80. Gulf Oil	29.5
52. Du Pont	55.4	81. Firestone Tire & Rubber	29.4
53. Olin Mathieson	53.4	83. Vitro	28.7
		87. Sinclair Oil	27.8
		93. Cities Service	26.2
		100. Sunray Mid-Continent	24.1


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NON-TOXIC – OUTSTANDING SEQUESTERANT IN CAUSTIC SOLUTIONS–LOW CORROSION RATE – EXTREMELY USEFUL IN THE FORMULATION OF CLEANING COMPOUNDS FOR ALUMINUM ETCHING, RUST REMOVAL, PAINT STRIPPING, GLASS MOLD CLEANING AND BOTTLE WASHING. ALSO USED IN ELECTROPLATING AND OTHER INDUSTRIAL SEQUESTERANT APPLICATIONS.
LOW TOXICITY–A PRIME MATERIAL IN ALKYD RESINS AND ROSIN ADDUCTS MANUFACTURE – USEFUL TO THE PAINT AND PLASTICS INDUSTRIES.
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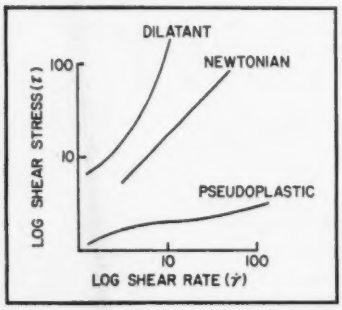
$$\eta = \frac{\tau}{\dot{\gamma}}$$

NEWTON AND THE NON-CONFORMIST FLUIDS

Newton's classical hypothesis, stated above, provides a basis for the study of viscous flow. However, many viscous fluids behave in a non-Newtonian manner. In polymer melts, for example, viscosity may vary with pressure and flow rate. These properties must be measured — with accuracy — in order that their behavior may be predicted in advance. Knowledge of flow behavior assists the researcher in studying molecular structure . . . helps the engineer in designing more efficient process equipment. Which is why we're using this space to tell you about the new Instron Capillary Rheometer, a valuable and versatile new tool for studying the behavior of polymer melts and other non-Newtonian fluids.



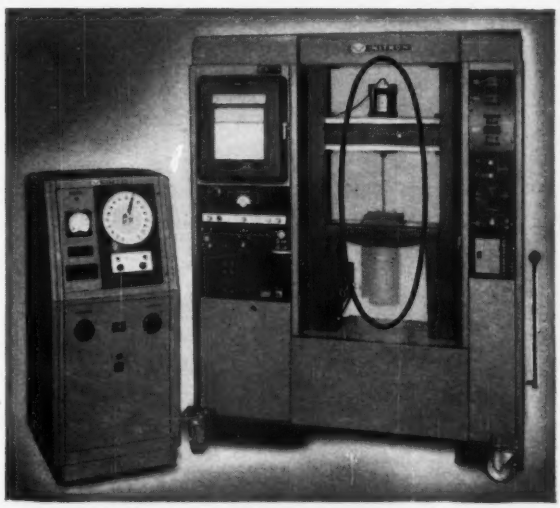
Newtonian fluids have constant viscosities with shear stress proportional to shear rate. Dilatant fluids show an increase in viscosity while pseudoplastics become more fluid at higher flow rates.

Designed for use in INSTRON Tester

The new Instron Capillary Rheometer (Type MCR) consists of an extrusion assembly mounted on an Instron Universal Tester. Temperature controls are contained in a separate cabinet. A sample of polymer or other non-Newtonian fluid is forced out through a capillary by a plunger driven by the moving crosshead of the INSTRON.

This basically uncomplicated arrangement makes possible a new level of convenience, accuracy, and versatility in the study of non-Newtonian fluids. For example:

Constant shear rate — The selected speed of the servo-controlled INSTRON crosshead is constant and independent of load; therefore, extrusion speeds and shear rates are constant. *Wide range of speeds* — The plunger is driven at speeds covering the range of 1000:1 in precise steps. *Permanent record* — Plunger force at each speed is detected by a load cell and plotted on the recorder. The force curve often indicates special flow properties such as critical shear rate. *Interchangeable capillaries* — For studying the effects of entrance, exit and transient losses. *High precision heat control* — a wide range of temperatures controlled to ±0.5°C.



Capillary Rheometer Mounted On Floor Model Instron

If you are interested in flow properties, write for our technical reprints on this subject. Also available: our ever-growing library of articles on advanced testing techniques, covering many fields — just mention your particular field of interest.

When accuracy is paramount it is the INSTRON that is often chosen to provide the standards — proof you can do more with an INSTRON. If you have any problem at all related to stress-strain testing, on any kind of material, write for the INSTRON Catalog.

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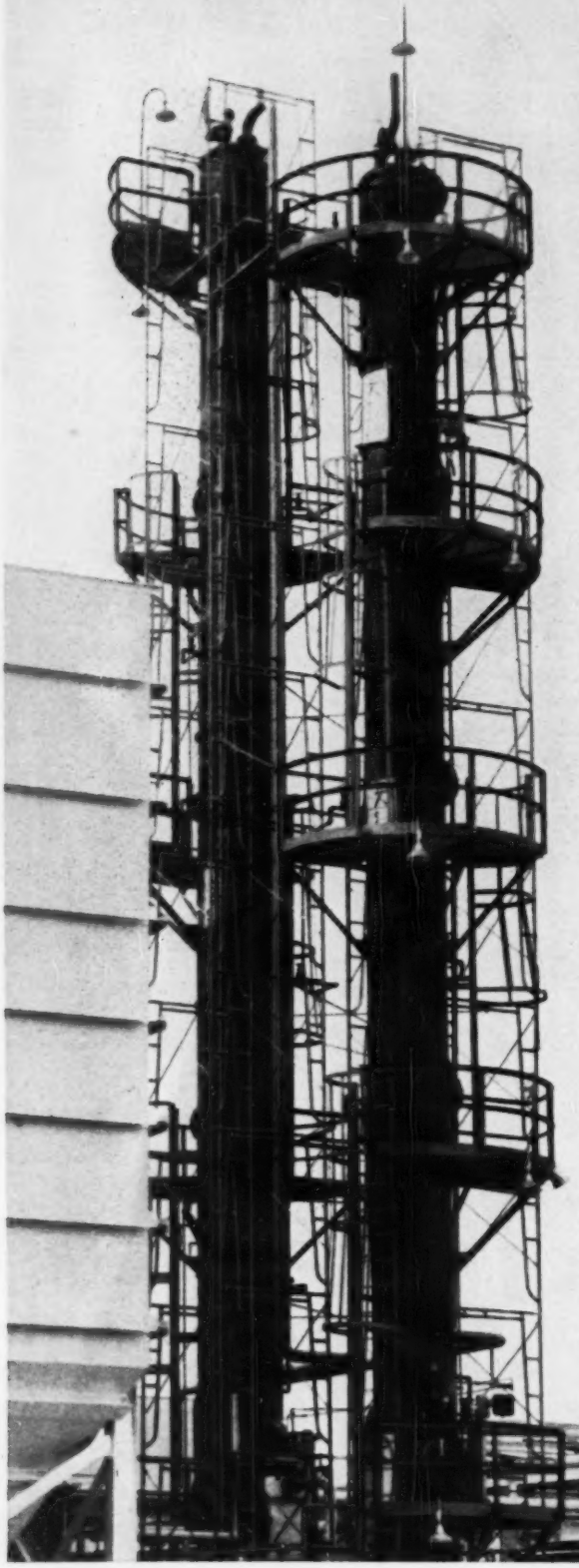
MHI'S MULTI-MILLION POUND PER YEAR SODIUM BOROHYDRIDE PLANT

puts the new world of hydride chemistry at your front door!



Even your remotest dreams of capturing new processing profits from hydride chemistry can now be brought to reality. The chemical of a thousand profitable possibilities — sodium borohydride — is now on the market in unlimited quantities. Price and availability need no longer be a barrier.

MHI's 10-acre sodium borohydride plant has a proven capability of producing in excess of 100% of rated capacity — of producing a product of highest purity and quality! Metal Hydrides Incorporated, the company that has pioneered hydride chemistry throughout the world is moving ahead . . . ready to supply any quantity of sodium borohydride in any form — amorphous powder, SWS (stabilized water solution) or in smooth, convenient sized pellets!

The time for you to move — is now! Those promising sodium borohydride based innovations or projects you ruled out in the past because of economics can be turned into profitable realities right now. Call or write MHI's Technical Service team, today!

M H I

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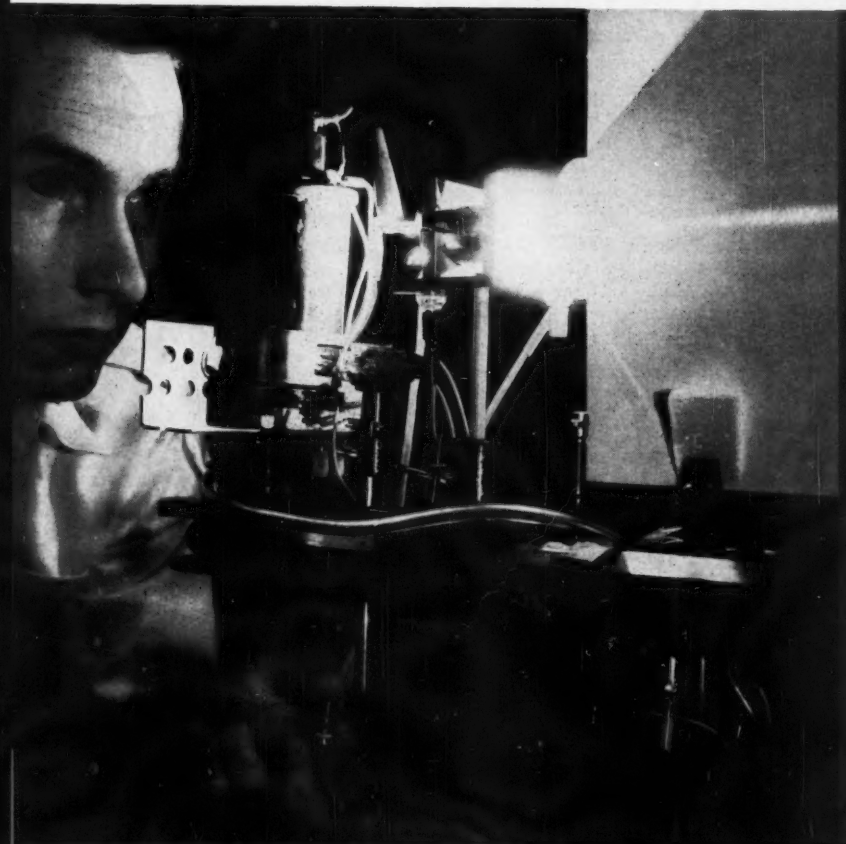
Metal Hydrides Incorporated

1000 Congress Street, Beverly, Massachusetts

Better energy converters like this optical maser start with crystal research



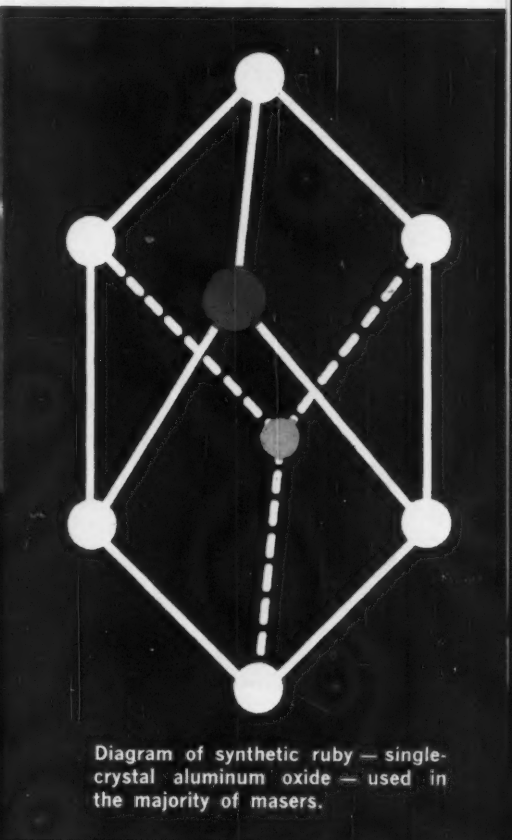


Diagram of synthetic ruby — single-crystal aluminum oxide — used in the majority of masers.

Key to Solid-State Success: Crystal Insight

The recent research spurt in solid-state materials for energy conversion and control is bringing one little-appreciated concept to the attention of more and more researchers: that the fundamentals of crystal-lattice structure and energy bands underlie many apparently unrelated devices — e.g. optical masers (picture, above), epitaxially grown transistors, electroluminescent panels, solar cells and thermo-electric units.

This critical observation was underscored by an international conference held on the subject last month at General Electric's Research Laboratory (Schenectady, N. Y.). The conference, cosponsored by GE and the Air Force Office of Scientific Research, was said to be the first devoted exclusively to this field—in spite of the years of research in various labs around the world.

In a recent interview with CHEMICAL WEEK, S. Benedict Levin, deputy director of the Institute for Exploratory Research at the Army Signal Research and Development Laboratory (Fort Monmouth, N.J.), also emphasized the importance of closer work between chemists and physicists at the crystal level.

And published reports by scores of laboratories in this country and abroad indicate the vital nature of basic crystal properties to the development of all sorts of devices, ranging from microminiaturized electronic circuits to ultrasonic transducers.

Because of the special nature of the crystals involved in most of these applications, they must be not only exceedingly pure but must generally also be of a specific physical orientation. In most cases (e.g., transistors, masers) individual single crystals are required to make an effective device. However, powders (and ceramics) can be utilized in cases in which it isn't essential for all the output from each crystal to go in the same direction (e.g., phosphors, transducers).

Semiconductor Focus: At the GE meeting, attention centered on the 3-5* materials (compounds of aluminum, gallium or indium with phosphorus, arsenic or antimony) and the 2-6 compounds (zinc, cadmium or mercury with oxygen, sulfur, selenium or tellurium). Many of these materials have been under study for

* The numbers refer to the elements' groups in the periodic table.

years, and some are commercially available. Monsanto, for instance, offers gallium arsenide, indium phosphide and indium arsenide. The firm makes the gallium compound (which has been heavily researched by Texas Instruments, RCA and many others) in single-crystal form by all three major crystal-growing techniques — float-zone refining, gradient freeze, and Czochralski crystal-pulling—each of which offers advantages for particular applications.

While aimed mainly at making high-temperature transistors and diodes, the properties of the 3-5 materials are quite varied, depending on the crystal structure. For instance a homogeneous "semi-insulating" gallium arsenide has been prepared at the Services Electronics Research Laboratory (Baldock, England), according to a paper read at the GE meeting. Described as more like a 2-6 compound in its electrical properties, the novel material poses theoretical problems that are currently being grappled with to improve understanding of the gallium arsenide lattice.

The use of a 3-5 compound as a p-n electroluminescent material was also suggested at the conference. Researchers from Philips Zentrallaboratorium (Aachen, Germany) described studies of gallium phosphide in which existing theories were found to correspond to observed performance. The study concluded that an efficient p-n light source should require at least two types of doping.

Among the 2-6 materials, zinc oxide and cadmium sulfide shared attention in work by A. R. Hutson of Bell Telephone Laboratories on their recently demonstrated piezoelectric effect. Since these materials are also semiconductors, they are being used for studies of effects produced by the interaction of lattice deformation and mobile charge carriers.

Examples of the many other semiconducting materials reported on at the conference: silicon carbide (electric, luminescent and photovoltaic properties), mixed crystals of tin sulfide and selenide (thermal conductivity and thermoelectric power) and titanium dioxide doped with columbium (semiconducting mechanism).

Optical Masers: The most vibrant field of crystal research at the moment is that of optical masers (or lasers, as they are becoming better known), devices that amplify light, convert it into a coherent, monochromatic beam. Since Hughes Aircraft demonstrated the first operating laser a year ago (*CW Technology Newsletter, July 16, '60*), several labs have announced similar success. Latest is the Army's Signal R&D Lab, whose ruby laser is shown in operation on p. 53 (along with a simplified model of the ruby crystal lattice — single-crystal aluminum oxide doped with a small amount of chromium).

Biggest hurdle in development of the laser, according to Levin, is the perfection of the host crystal, from both a structural (physical) and a compositional (chemical) point of view. In spite of the work done to date, he says, researchers still lack both the theoretical principles to specify the best host crystal and the techniques to produce it. Presently in the stage of early enthusiasm, he notes, laser research will probably go through the subsequent stages of disillusionment, plodding research and final blossoming that characterize most successful projects.

Crystal Light: Another form of crystals that emit light are phosphors. They are seldom thought of in the same category with lasers, but they also depend on similar concepts of internal crystal energy gaps. Electroluminescence, light from phosphors that are subjected to an electric field, is probably the most active field in this area, with commercial products being offered by Sylvania, GE and others.

Military interest in electroluminescence, says Levin, is based on a need for large display panels. Present large panels require some sort of projection mechanism, while existing electroluminescent panels are limited in size and usefulness by poor resolution (about ¼ in.) and cumbersome circuitry. Materials advances may help solve these problems.

Although the 2-6 compounds (doped with various metals) are the most-used, work on the 3-5's is moving along. The Signal Lab has studied gallium phosphide, for instance, is now working on aluminum nitride.

Thin-Film Approach: Another method of improving phosphor performance is the thin-film crystal layers developed at GE. Rather than using a phosphor powder (which has inherent inefficiencies due to light scatter-

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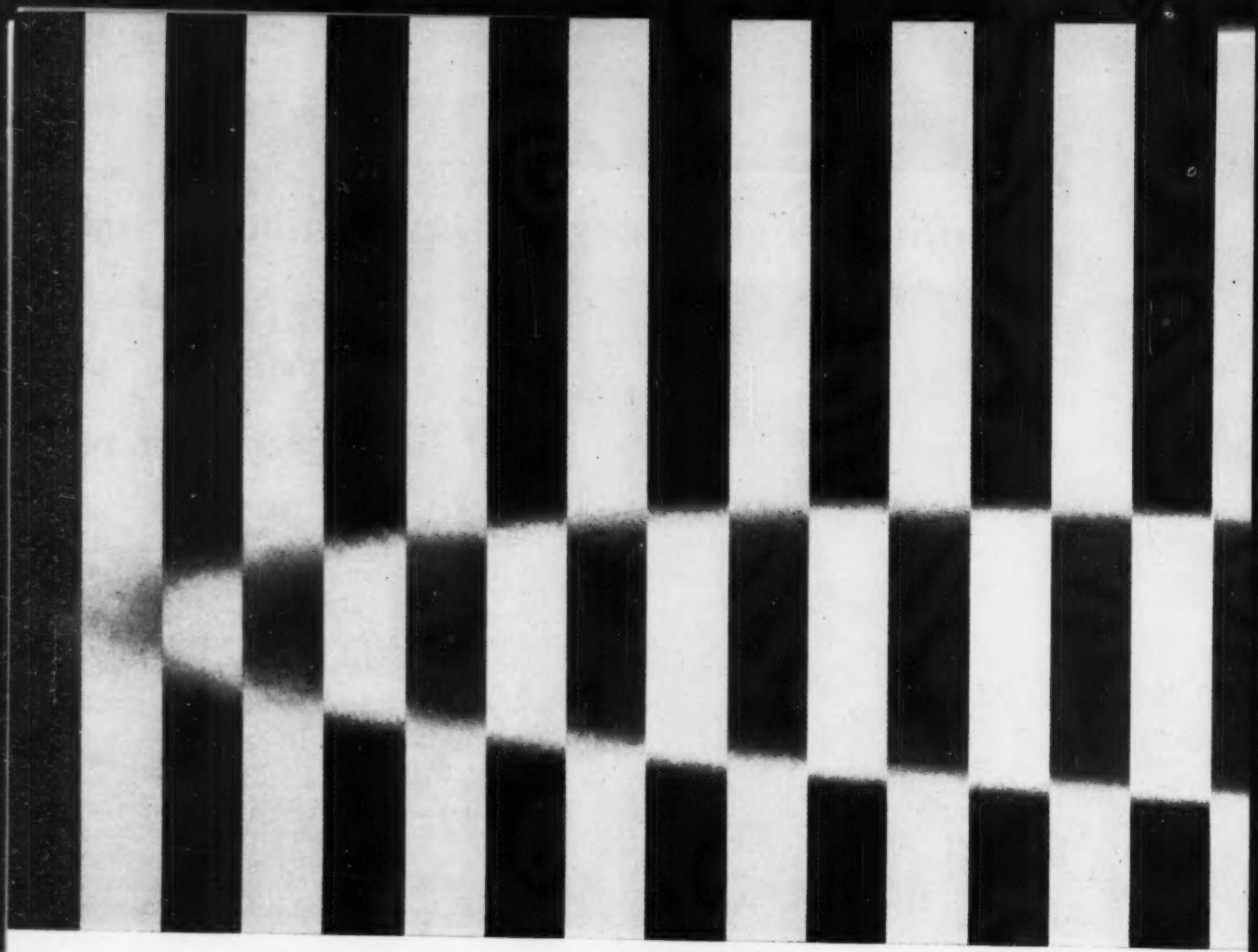
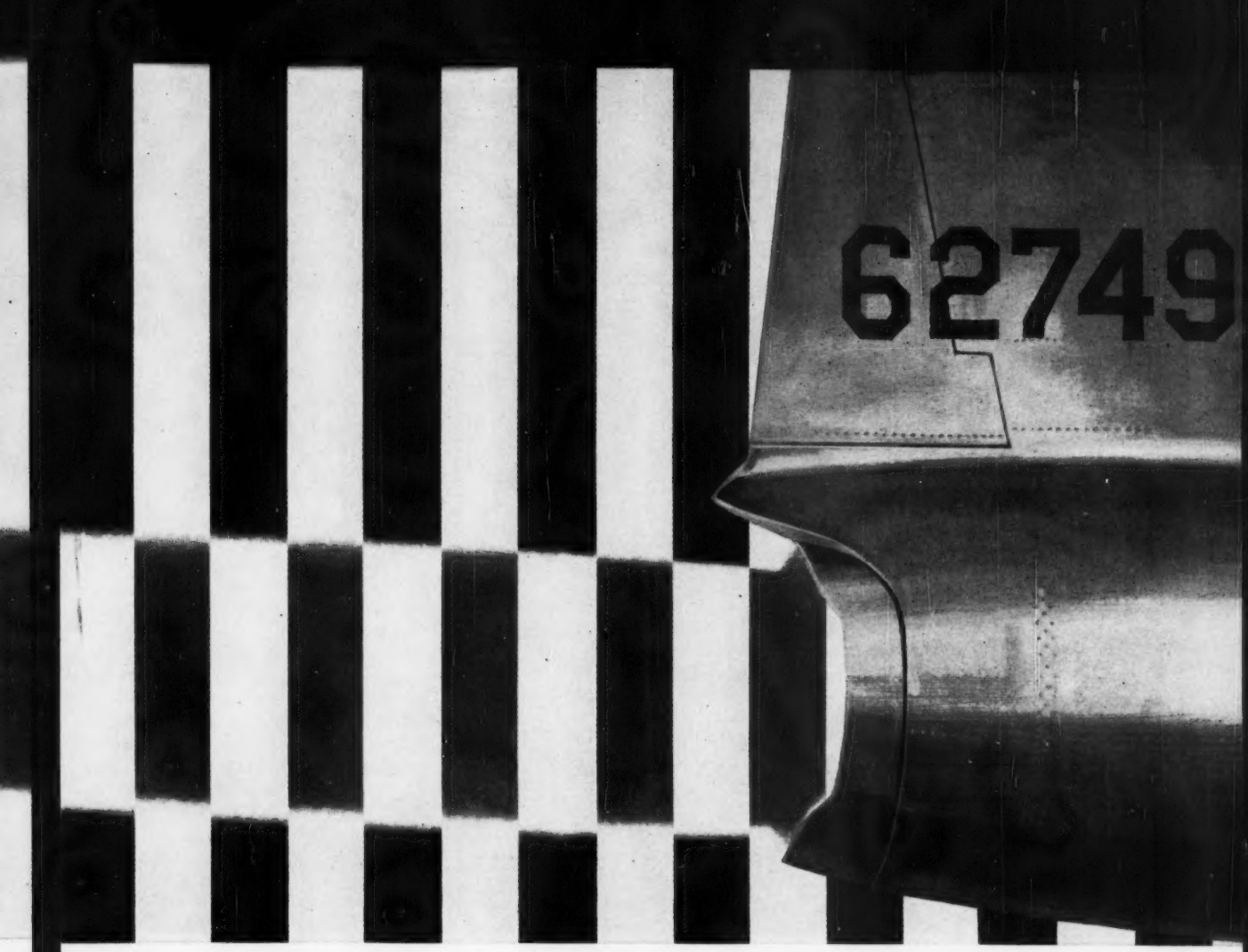


How to cook jet fuel



When a jet clips along at about Mach 2, everything gets hot—not only the exhaust gases and aircraft skin, but the fuel itself. So when Pratt & Whitney Aircraft tests an engine on the ground, every component is checked out under conditions that simulate flight environment. The fuel must be heated to 550 degrees F to duplicate high speed conditions.

But, on the ground among crews of technologists and in the middle of expensive installations, how do you safely heat up a fuel that's as touchy as a bomb?

Pratt & Whitney Aircraft uses a unique Monsanto chemical called Aroclor 1248. It's fire resistant and chemically inert. It can be heated to 600 degrees F without breaking down or boiling. This oily liquid is heated to the desired temperature at a site hundreds of feet away from the fuel. The hot liquid is piped at pressures up to 30 pounds per square inch to a heat exchanger where the heat is transferred safely to the explosive jet fuel. The temperature can be controlled to within 2 degrees; thus providing maximum safety and accuracy for the static test facility.

United States Steel is a major supplier of benzene of uniform quality for the manufacture of Aroclor 1248 and related chlorinated polyphenyls. Inert, chemically stable, fire resistant Aroclor 1248 is another example of the unique products derived from USS Chemicals—basic building blocks for organic chemical manufacturing.

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Aroclor is a registered trademark of the Monsanto Chemical Company

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ing between crystals), GE vaporizes the elements (e.g., zinc and sulfur), which react as they deposit on the surface to form an even phosphor layer in the micron thickness range.

Thin-film technology is also of keen interest in other materials, notably those used in computers. International Business Machines, for instance, has done considerable work on thin films of ferroelectric and superconducting materials to miniaturize computer components.

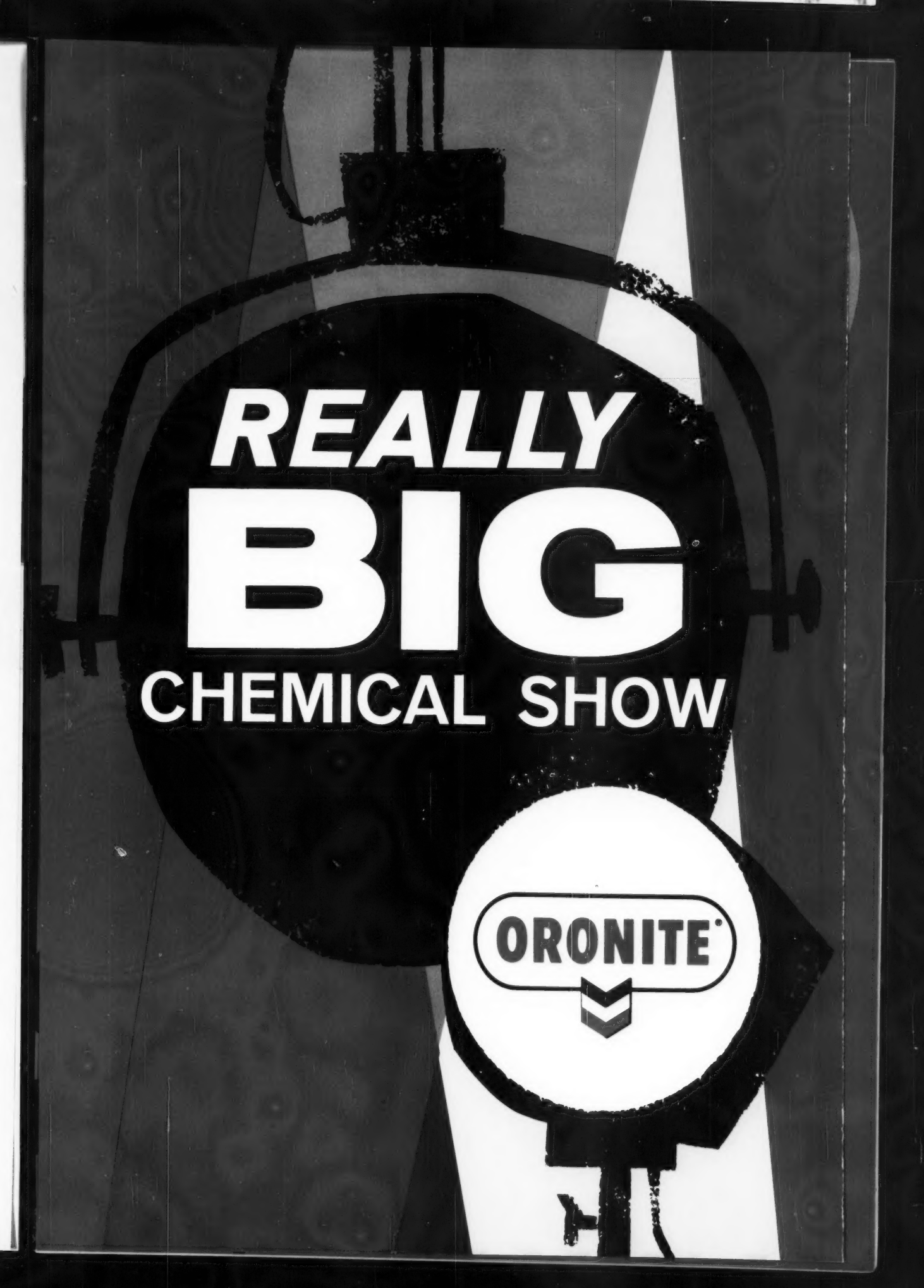
The Signal Lab says it is also interested in this technique, is investigating the magnetic, optical and electronic properties of yttrium iron garnet in films only 100-1,000 Å thick.

Epitaxial growing of semiconductors is another example of how control of crystal structure can be used to improve solid-state properties and allow the production of smaller units. In this technique, a thin layer of a high-resistivity material is grown on a low-resistivity substrate by vapor deposition (decomposition of a compound of the desired element) without disturbing the single-crystal structure of the unit. Sylvania claims to have made the world's fastest silicon and germanium switching transistors by this method.

Wide-Spread Interest: The interest in fundamental crystal studies to help improve and explain solid-state properties reaches into even more fields of interest, including thermoelectric materials, photoconductors and the exceedingly complex field of organic semiconductors. And the realization that fundamental research in the solid state can pay off in any one of these many fields is leading more researchers to undertake such studies, without having a specific type of application in mind at the start of the work.

The Signal Lab's high-pressure, high-temperature synthesis work is an example. Among the materials that have been prepared in this program are diamonds (some forms are semiconductors), β-boron nitride (the extremely hard cubic crystal form that doesn't occur in nature) and cosite (a dense form of silicon dioxide that is a good dielectric, resists hydrofluoric acid).

Those firms that fortify themselves with a fundamental physical-chemical knowledge of crystals are likely to find that they will be in a position to use it in a wide variety of fields.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Phthalic Anhydride

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With maleic anhydride production from a modern, new 20,000,000 lbs. per year plant, Oronite adds significantly to its position as a major supplier of dibasic acids. Oronite Maleic Anhydride is derived from a process of oxidation of benzene and suitable catalysts. Molten maleic is available in tank car or tank truck shipments or it can be supplied in briquet form in bags and drums. Oronite's close affiliation with a major oil producing company is assurance of raw materials for maleic production — and your guarantee of a reliable source of supply. Oronite maleic is particularly suitable for preparation of light color polymers and adducts used in plastics manufacture. Write or contact the Oronite office nearest you for a copy of a new bulletin, "Oronite Dibasic Intermediates" which gives properties, specifications and uses of Oronite Maleic Anhydride.

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Fumaric Acid

By mid-1961 a new Oronite facility is scheduled for production of this fine, free-flowing crystalline powder. Fumaric acid has a molecular structure closely related to maleic anhydride with fumaric acid being the hydrated trans-isomer of maleic. Both fumaric and maleic have many of the same uses but there are many cases where one is preferred over the other for a specific application. Oronite's Fumaric acid high heat resistant properties will make it ideal for polyester plastics where heat is a factor. Combined with Oronite Isophthalic, the highest heat distortion temperatures possible are obtainable. Ask your Oronite representative for specific recommendations and, also, write for your copy of "Maleic Anhydride-Fumaric Acid-Multi-functional Building Blocks" which details the properties, specifications and recommended uses of these two Oronite dibasics.

Product Characteristics

*Trademark for California Chemical Company's detergent intermediate.

Product Uses

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Oronite's cumene process acetone has a minimum purity of 99.5%, is typically 99.8% which more than complies with the ASTM requirements. Highly pure Oronite Acetone is widely used as a solvent and as an intermediate in chemical and drug manufacture. Quick delivery is available from nearby bulk terminals by tank car and tank truck or drum stocks. Contact your nearest Oronite office.

Phenol, U.S.P.

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Alkane® Detergent Intermediate

A waterwhite liquid detergent raw material made by alkylating benzene with propylene polymer. With this basic ingredient, pioneered and first commercially produced by Oronite, detergents have largely replaced soaps. From almost insignificant detergent sales in 1946, detergent manufacturers have built household detergent sales to 76% of the total detergent-soap market in 1960. Today as the world's leading supplier of detergent raw materials Oronite continues to make improvement in alkylates which offer the housewife even greater performance and convenience in the finished detergents she buys. One of these advances is ALKANE 60, a higher molecular weight alkylate which provides heavy-duty detergents with: (1) improved foam performance in soft warm water; (2) improved cleaning performance in soft warm water; (3) satisfactory performance with NO costly foam booster; (4) improved skin irritation characteristics. Oronite is aware of the ever-present demands of the detergent manufacturer for better household detergents, and you can be certain that whatever shape or form detergents take, Alkane based detergents will continue to dominate the market. You expect more from the leader, and you get more. Contact any Oronite office for detergent raw material or processing information.

Xylenes (Meta, Ortho & Para)

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Detergent Materials

Other Surface Active Materials

SA-88. Oronite SA-88 (sulfonic acid) is an intermediate detergent in liquid form, resulting from the sulfonation of Oronite Alkane detergent intermediate. The major advantage of SA-88 is that it allows compounders a wide selection of neutralizing agents to produce finished detergents with tailored characteristics. **Wetting Agent "S" & Detergent Slurry.** Both materials are paste type Alkane sulfonates derived from caustic neutralization of SA-88 (sulfonic acid). They are easily processed into liquids or dry detergents in flake, granule, bead or powder form. **Dispersants NI-E, NI-O, NI-W.** All of these products are nonionics in liquid form of the alkylphenol ethylene oxide condensate type. Dispersants NI-O and NI-E are oil soluble, with NI-O being slightly more hydrophilic. NI-O and NI-E are used primarily in the formulation of dry cleaning detergents and for the preparation of industrial emulsifiers. NI-W is water soluble and finds its primary use in compounding heavy duty household and industrial detergents.

Product Specifications

Dibasic Acids

Oronite, one of the world's petrochemical pioneers, is today a leading supplier of dibasic acids derived from petroleum. In 1945 Oronite began the first production of *phthalic anhydride* from ortho xylene, a petroleum derivative. In 1950 *isophthalic* existed only as a laboratory curiosity. Oronite brought this new dibasic into commercial production in 1956 with a 50-million pounds per year plant. Late in 1960 Oronite announced large scale production of *maleic anhydride*—the first such plant on the West Coast. In mid-1961 still another dibasic, *fumaric acid*, will be added to the growing line of Oronite produced dibasics. The Oronite Division of the California Chemical Company, a subsidiary of the Standard Oil Company of California, is affiliated with one of the world's largest producing and refining oil companies. With unlimited raw materials available you are assured of Oronite's capability of fulfilling its product commitments. And you can be equally sure of Oronite's further expansion in the dibasic acid field whenever and wherever customers can be better served. Why not talk over your dibasic requirements with Oronite? Possibly Oronite can better serve your needs.

Isophthalic

Isophthalic is derived by the oxidation of meta xylene and is marketed in the form of free-flowing, non-caking, high melting white crystals. Chemically related to phthalic anhydride, isophthalic differs in physical properties and reaction characteristics. Isophthalic was pioneered and first commercially produced by Oronite. It is proving to be one of the most significant new dibasic materials for the protective coatings plastics industries in over half a century. Oronite Isophthalic is a basic ingredient for improving alkyd and polyester resins. Product improvements can be obtained in fast air-drying and low-bake equipment enamels; fiberglass reinforced plastic boats, car bodies, truck cabs, furniture, refrigerator doors, cable spools, luggage; better quality sporting goods—skis, fishing rods, pole vault poles, golf club shafts, etc.; automotive parts, card files, swimming pool copings, etc. Isophthalic's many applications in the plastics field include monomeric diesters, saturated and unsaturated polyesters, polyamides, polyester-amides, polyesterurethanes, and copolymers. Information on the use of isophthalic in the aforementioned applications is available from Oronite—your most experienced isophthalic supplier. Technological information on isophthalic and on its many applications is available from Oronite. Or, ask your resin supplier about isophthalic alkyd or polyester resins. And if you wish the names of Oronite Isophthalic resin suppliers near you, just contact our nearest office. Ask us to demonstrate to you how isophthalic can improve the products you use or market.

ORONITE®

Lube Oil Additives

Oronite markets to oil companies and compounders a comprehensive line of complex chemical oil additives which, when added to motor oils, enhance the service life of internal combustion engines as well as improve their performance. In the area of advanced additive products, Oronite has just introduced the *first* completely ashless additive. This breakthrough is considered a major accomplishment in setting a new standard of quality for compounded motor oils. Oronite will provide oil formulations to a customer's exact needs and specifications, using the customer's base oil. Just tell Oronite the level of performance you desire whether in diesel or gasoline equipment. Oronite will provide complete performance formulations or furnish special performance additives. Talk over your "oils" with an Oronite additive specialist. See the depth of experience available to you.

Polybutenes

Oronite Polybutenes are clear colorless liquid synthetic polymers which are available in a wide range of viscosities—up to 20,000 S. S. U. at 210°F. They are extremely versatile materials and have contributed to the improvement of a variety of products as well as having helped make many new products possible. Their non-drying, tacky, viscous, stability and light color characteristics make them suitable for applications such as automotive caulking compounds, soundproofing compounds, thermal insulation, industrial and household caulking compounds, adhesives, special purpose greases and lubricants and in the manufacture of lubricating oil additives. Polybutenes are valuable as extenders for rubbers and as plasticizers for resins. Outstanding electrical properties and low permeability to gases makes Oronite polybutenes useful as impregnants for paper insulation of electrical cable, dielectrics for capacitors and for cable oils. Their hydrophobic properties make them useful in waterproofing compounds, leather impregnants, coatings for porous materials such as cement and cinder block. For helpful polybutenes technical bulletin and product samples, contact the Oronite office nearest you.

A Dependable Supplier

ORONITE

Highest Quality

Chevron Resins. If you require a polyester or alkyd resin of specified individual characteristics, check with Oronite. Oronite is also now equipped to supply custom-made resins with unusual properties. Address your inquiry, giving as many details as possible, to Resin Sales Section, Oronite Division, 953 South Hope Street, Los Angeles 15, California. **Gas Odorants.** Oronite provides for the gas industry the most complete line of gas odorants. These odorants are used by utilities and transmission companies as warning agents for natural and liquefied petroleum gases. Oronite produced the first commercial odorant for natural gas and is today a major supplier of odorant products. Write for technical bulletin. **High Temperature Hydraulic Fluids.** Oronite developed High Temperature Hydraulic Fluids for the U.S. Air Force and aircraft industry. These non-petroleum based fluids perform at temperature ranges of from −65° to over 500°F, at pressures exceeding 4000 psi. **Naphthenic Acids.** Call any Oronite office for information on high quality California naphthenic acids. **ADE-50.** A quaternary ammonium compound in clear liquid form used principally as a high grade sanitizer and germicide. **Alkylphenol TD.** A dodecylphenol, clear and slightly viscous liquid, which can be reacted to produce various types of non-ionic detergents. Potential uses include dyestuffs, insecticides, germicides, fungicides and anti-oxidants. **Butadiene.** Polymerization grade, 98% minimum purity. **Copper Naphthenate.** Used as a preservative for burlap, canvas and cellulose products against attacks of bacteria, fungi, wood parasites and marine organisms.

Research and Technical Service

Oronite's ability to market new products, as well as continually produce better products, is the undeniable result of the quality of its research and technical service programs.

It is unlikely any other petrochemical producer-marketer has as many scientists and technicians devoted to research on petroleum and petrochemical products. Oronite's program is carried on by California Research Corporation, a subsidiary of Standard Oil Company of California. Laboratories employing over 1500 men and women are situated near manufacturing facilities in Richmond and El Segundo, California.

Oronite *technical service* supplies the customer product specialization in its field representative organization. Products are so aligned to enhance communications and provide better service between research facilities and the Oronite customer. You can expect Oronite to provide you production, processing and product development information. Oronite has compiled a comprehensive store of technical information and know-how on its products and their application—all of which is available to Oronite customers.

You will also find Oronite willing and capable of participating in substantial research and cooperative technical service programs in developing new chemical products. Facilities and personnel available for this type of work are second to none in the nation.

Get acquainted with Oronite—where chemical raw materials are born and produced in volume.

CALIFORNIA CHEMICAL COMPANY
ORONITE DIVISION

EXECUTIVE OFFICES • 200 Bush Street, San Francisco 20, California
SALES OFFICES • New York, Wilmington, Chicago, Cincinnati, Cleveland, Houston, Tulsa, Los Angeles, San Francisco, Seattle

CALIFORNIA CHEMICAL INTERNATIONAL, INC.

SALES OFFICES • Panama, Sao Paulo, Geneva, Tokyo and San Francisco

Oronite products are available from California Chemical International distributors.
Some 44 foreign distributors serve overseas customers.

Tiny Transistors

A scientist at the Radio Corporation of America's Princeton, N.J., research center examines an ultraminiature transistor test unit (*above*) containing three thin-film cadmium-sulfide transistors.

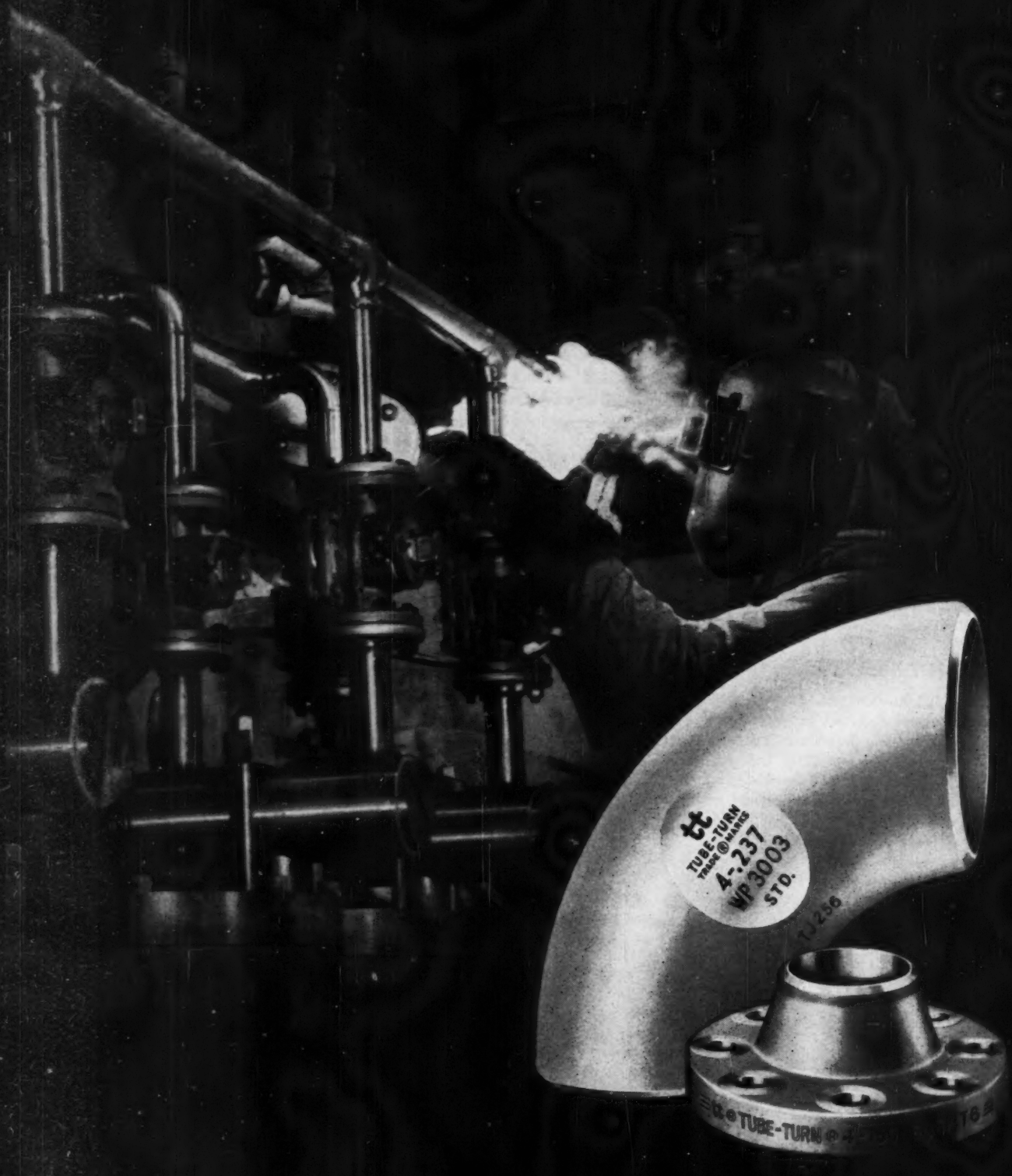
An important feature of the new transistor is its principle of operation—which is directly opposite that of ordinary transistors. The cadmium sulfide acts as an insulator, hampers the electron flow between two electrodes. A third element provides control by increasing the flow in varying degrees.

CONTRACTS

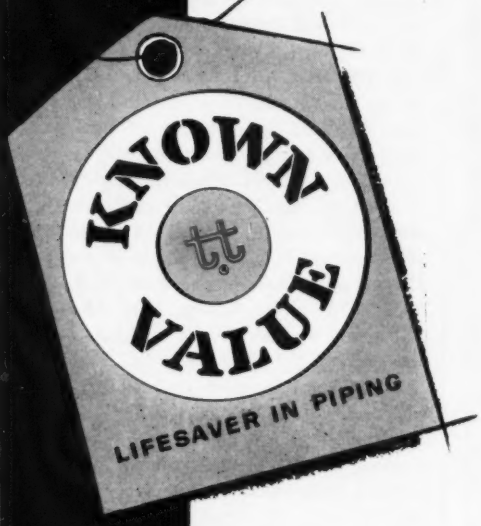
• $500,000 contract for research and development work in the field of high-energy solid propellants has been awarded to Du Pont by the U.S. Air Force. The work will be conducted at Du Pont's Explosives Department at Gibbstown, N.J., for the Air Force Flight Test Center (Edwards Air Force Base, Calif.).

• Texas Instruments Inc. (Dallas) has been awarded an Air Force contract of $268,000 to design and develop an unattended marine seismic monitoring system. Part of project Vela Uniform of the Advanced Research Projects Agency, the system will operate by itself at the bottom of the ocean, automatically recording seismic signals and noise in digital form on magnetic tape.

What's new in alloy piping components



. . . . get it first from TUBE TURNS



Through the science of metallurgical research has come an ever wide use of new "wonder" metals and alloys for critical-service piping systems. And to assure the selection of the *right* piping components for these systems has come the most logical trend to specify them by brand name. More and more the name specified has been TUBE-TURN. This is also most logical as no other name in welding fittings and flanges means so much.

TUBE-TURN alloy fittings and flanges are the product of pioneering, of a wealth of experience without equal, of an investment in related research and engineering exceeding that made by all other such manufacturers *combined*. TUBE-TURN alloy fittings and flanges are universally recognized and accepted as a mark of *known value*. This is why TUBE-TURN alloy fittings and flanges were selected for the now historic Manhattan Project, and specified for subsequent nuclear powered vessels. This is why TUBE-TURN corrosion-resistant, non-contaminating alloy fittings and flanges are preferred by the Petrochemical and Chemical Processing Industries. This is why experienced piping engineers everywhere look first to Tube Turns for the *latest* in alloy piping components.

Safeguard the performance of your critical-service piping systems with genuine TUBE-TURN alloy fittings and flanges. Your authorized Tube Turns Distributor is ready to serve your needs for Stainless Steels, Aluminum, Nickel, Monel, Inconel, Hastelloy B & C, Copper, Silicon Bronze, Red Brass, Admiralty Metal, Titanium, Zirconium, Zircaloy and other ferrous and non-ferrous metals and alloys. For further information write today for Bulletin G-143.
TUBE TURNS, Louisville 1, Kentucky.

"TUBE-TURN" and "tt" Reg. U.S. Pat. Off.

Inferior Substitutes Can Be Avoided!

Specifications calling for TUBE-TURN welding fittings and flanges with "or equal" wording need not be the open door to risk and trouble. Responsible suppliers and contractors will not only serve you honestly and properly, they will be glad to provide proof of it. They will give you an affidavit that they have met your specifications to the letter . . . that they have furnished genuine TUBE-TURN welding fittings and flanges complying with all requirements of applicable ASTM Specifications and ASA Standards. This is a sensible procedure for everyone concerned. Write us today for Bulletin 1031-G-143 on this subject.

TUBE-TURN Alloy Fittings and Flanges are Stocked By and Sold Exclusively Through Authorized Distributors.

TUBE TURNS

Division of CHEMETRON *Corporation*

EXPANSION

• Jason L. Saunderson, optical emission spectroscopy specialist, has formed Research and Control Instruments, Inc. (10 Jefferson Ave., Woburn, Mass.). The new firm has developed and will manufacture and distribute what is said to be a radically new line of direct-reading spectrometers, spectrographs and related equipment. The firm plans to enter the field of chromatography with an instrument specially designed to analyze combustion products such as heat-treat furnace atmosphere, coke-oven gas and environmental gaseous atmospheres.

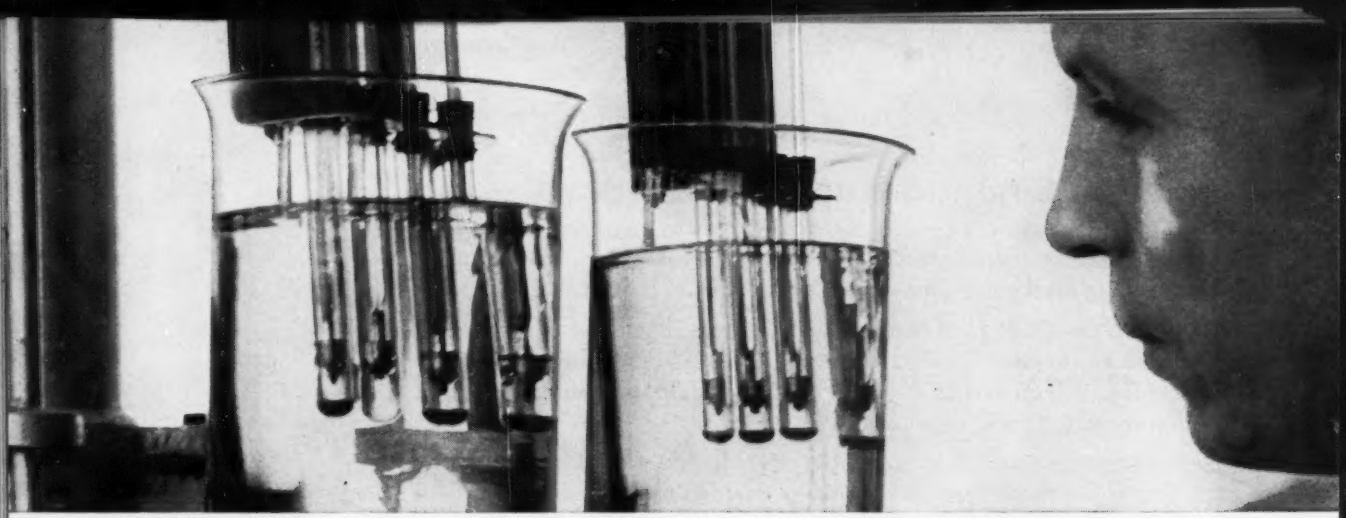
• The Dept. of Interior's new Office of Coal Research is getting under way with the appointment of three men: G. Edward Larson, of Havertown, Pa., who will take over the post of chief of the division of contracts and administration; Neal P. Cochran, of Frederick, Md., who will head the division of utilization; and Bernard S. Beckler, of Silver Spring, Md., who will handle the division of economics and marketing.

• Phillips Petroleum Co. (Bartlesville, Okla.) has contracted for the construction of an electromechanical building at its research center west of Bartlesville. The building is scheduled for early spring completion, will provide laboratory, office and machine shop space for about 145 employees now working in other nearby locations.

• The Chemstrand Technical Center (Decatur, Ala.) was opened recently to house Chemstrand's engineering department, acrylic fiber development laboratory, purchasing department and applications research and service department—all in eight separate buildings. Chemstrand's basic research is carried on at its new center at the North Carolina Research Triangle.

• Grand Central Rocket Co. recently completed a $625,000 Propellant Research Laboratory at Mentone, Calif., to carry out research on rocket fuels.

• Borden Chemical Co.'s fourth research laboratory in the West and its 20th in the country, was recently opened in Springfield, Ore. Work will be devoted chiefly to the development of new adhesives and synthetic resins for various wood-using industries. The lab includes a complete plywood lay-



Dropping point test shows how greases react to heat. Beaker fluid has been heated to 390°F. All greases tested except Darina (second tube from let) have passed from solid to liquid state.

BULLETIN:

Shell reveals the remarkable new component in Darina Grease that helps it save up to 35% on grease and labor costs

Darina® Grease is made with Microgel*, the new thickening agent developed by Shell Research.

Darina lubricates effectively at temperatures 100° hotter than most conventional soap base greases can withstand.

Read how this new multi-purpose industrial grease can help solve your lubricating problems and even save you up to 35% on grease and labor costs.

THERE IS no soap in Darina Grease. No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina uses Microgel—a grease component developed by Shell Research.

What Microgel does

Because of Microgel, Darina has no melting point. It won't run out of gears or bearings.

Compared with most conventional soap-base greases, Darina provides significantly greater protection under adverse service conditions.

Mix water into Darina and the grease does not soften. It shrugs off water—won't emulsify.

Resists heat

Darina will withstand operating temperatures 100° hotter than most conventional multi-purpose greases. It cuts leakage and reduces the need for special high-temperature greases.

Also, Darina resists slumping, thus forming a more effective seal against foreign matter.

Saves money

Shell Darina can reduce maintenance expenses while it protects your machinery. Savings of up to 35% on grease and labor are quite possible.

In some cases lubrication intervals have been extended to double what they were before. Less grease is consumed and less time consumed applying it.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

*Registered Trademark

SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are helping to provide better products for industry

THE MOST COMPREHENSIVE TECHNICAL CENTER in the packaging field assures Continental Can Company's customers—and *their* customers—that new and improved packages will be ready for the dramatic marketing innovations of the '60s.

Located in the Chicago area, the four buildings illustrated here represent an investment of $20,000,000. They are staffed by 700 outstanding scientists and engineers and are equipped with the most modern research tools available.

Central Research and Engineering, where a "dignified disrespect for the way things are done now" is a creed, is devoted to long-range and fundamental research on the frontiers of packaging. *The Metal Research and Development* facility, the first and the largest of them all, concentrates upon new and improved metal containers and fabricating equipment designed to lower costs, increase speeds and improve quality.

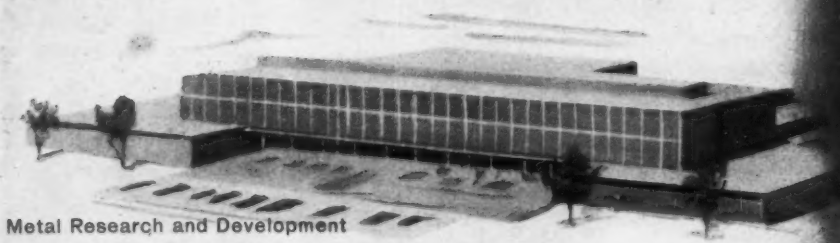
Two other buildings—just opened—complete the picture. *General Packaging Research and Development* brings together the paper, plastics and closure technologies of six product divisions and provides an ideal environment for the development of packages made of combinations of materials. And the new *Glass Research and Development* building will be devoted to an advanced technology for the world's oldest packaging material. This technical package adds one more reason why—

Continental has, and will have, the right package for you!

CONTINENTAL CAN COMPANY

SERVING INDUSTRY... SERVING AMERICA

CANS • VAPOR-VACUUM® CLOSURES • FLEXIBLE PACKAGING • FIBRE DRUMS • SHIPPING CONTAINERS • STEEL CONTAINERS • PAPER CONTAINERS • PLASTIC CONTAINERS • FOLDING CARTONS • DECOWARE® • CROWNS AND CORK • BONDWARE® • HAZELWARE® • BAGS • CONOLITE® • GLASS CONTAINERS • METAL CAPS • KRAFT WRAPPINGS • BOXBOARD • CONTAINERBOARD • MULTIWALLS



Metal Research and Development

Hazel-Atlas Glass Research and Development


General Packaging Research
and Development
Central Research and Engineering

up plant, a set of hydraulic presses for making research quantities of various boards, a pilot plant for engineering process work and laboratory models of commercial adhesive-spreading equipment.

• W. R. Grace & Co.'s central research laboratories at Clarksville, Md., expanded its new-product department and agricultural chemicals research departments. Cost: more than $500,000.

• A $1-million expansion program is planned for Calbiochem (California Corporation for Biochemical Research) of Los Angeles, manufacturer and supplier of a wide range of rare biochemicals used in medical research. The program calls for establishment of the new Calorganic Division.

PRODUCTS

Five Entries: The City Chemical Corp. (New York) is now making available from its Jersey City, N.J., plant, experimental quantities of cadmium oxalate, cupric glycolate, sodium mandelate, and stannous pyrophosphate.

•

For Steroids: Applied Science Laboratories, Inc. (State College, Pa.), has added ethyl oleate, ethyl stearate, ethyl palmitate and ethyl caproate to its line of high-purity (99%) fatty acid derivatives. Other ethyl esters can be synthesized to order. Also, the firm now has available a form of neopentyl glycol adipate polyester, useful for the chromatographic analysis of steroids, fatty acid esters. It is said to have good thermal stability at 250 C. For this purpose, the polyester is coated on Gas-Chrom P solid support. Both the stationary phase and the packing (the polyester) of such column packings are pretested in a chromatograph, and the results are supplied with each order.

•

Organic Intermediates: Tennant Chemical Division of the Tennant Development Corp. (Newton, N.J.) is planning to produce a broad line of "tailored" organic intermediates.

•

Steroid Intermediates: Mann Research Laboratories (New York) is now making available steroid intermediates used as standards in chromatography, in biological studies and synthesis.

BECCO ECHO

PUBLISHED BY BECCO CHEMICAL DIVISION Food Machinery and Chemical Corporation, New York 17, N.Y.

COLOR! Use bleach?

AT the moment you open your newly-developed color film, we know you couldn't care less about the procedure for developing those wonderful snapshots that you took. But, take a few moments to consider the quality-control program involved . . . and Becco's seemingly incongruous role in the developing process.

At Kodak Park, in Rochester, New York, Becco's Potassium Persulfate is used in developing color films. A little-known fact is that a bleach bath is an integral step in the production of the color image. A simple and economical chemical operation, replacing earlier expensive and space-consuming electrolytical equipment, takes place when Becco's Potassium Persulfate is added to the bleach used in the developing process. The bleach, used to convert silver to soluble form and thereby allowing the final "fix" bath to reveal the full color, must be rejuvenated at regular intervals. This is done by adding ferrocyanide and Becco's Potassium Persulfate to the bleach. Oxidation occurs, and the ferrocyanide becomes ferricyanide. The bleach is then ready for further use.

Kodak is one of many companies using Becco's Potassium Persulfate. Other companies in various industries, such as rubber, textile, and plastics, put our Potassium Persulfate to good use.

Becco Bulletin No. 11 gives the complete story of Potassium Persulfate, including its lists of properties, best handling and storage methods, and gives charts of its stability and solubility. It's yours for the asking . . . just write us on your letterhead, asking for it by number. Address: Dept. CW-61-10.

Colorama reproduced in Grand Central Station, New York in 60-foot by 18-foot size.

BECCO ECHO

No Fish Story Here!

MEN are natural exaggerators when they describe the results of their fishing trips. Let them catch a minnow, and they bring home a whale! Becco, on the other hand, bends over backwards to assure *accuracy* in the delivery of specified quantities of hydrogen peroxide to its customers.

Thoroughly cleaned and carefully inspected aluminum drums are placed singly on Howe or Toledo scales; the reading is set at zero. The drums are filled with filtered hydrogen peroxide until the scale shows the labelled shipping weight. Carboys are handled similarly. These scales are inspected monthly by representatives of the scale company to maintain accuracy.

At our Buffalo plant, a Howe Track Scale and Type Registering Weighbeam is used for weighing tank cars and tank trucks. In the case of a tank car, the vehicle is placed on the scale, weighed, and a record is made of the tare weight. Filtered hydrogen peroxide is pumped into the car until it is filled to the base of the dome. It is then inspected, since the load, if not filled to the exact height, can cause the car to oscillate dangerously when it is in motion. The car is sealed and weighed. The difference between the two readings is the weight of hydrogen peroxide in the tank car. Finally, Becco's accounting department and the railroad receive copies of the printed records. The scales used are inspected and tested four times a year, and no inaccuracies have ever been reported.

The weighing of tank trucks is handled with similar care to ensure accurate delivery, and a weight certificate is furnished to each customer.

So, the fishermen have their stories, and we have ours—and ne'er the twain shall meet!

MORE than a third of a century of experience shows! Ever since it was founded 36 years ago, Becco has devoted its time and energy to the manufacture of hydrogen peroxide and to research in its application. Today, Becco provides industry with 10 additional peroxygen chemicals based on electrolytically-produced hydrogen peroxide.

Becco serves many industries—textile, paper, plasticizers, cosmetics, metal finishing, and is even doing its share in the fields of missile guidance and propulsion. The broadened use of peroxygen chemicals owes much of its present state to Becco's Research and Development staff which continuously studies customers' needs in an effort to keep pace with today's—and tomorrow's—world.

The technical "know-how" of our chemists, engineers, and technical fieldmen is available to you. Their experience has been condensed in a series of technical bulletins. A few are listed at right. If you find any of interest, just drop us a line on your letterhead and ask for the ones you want by number. We'll be happy to oblige.

AVAILABLE TECHNICAL BULLETINS

Product Descriptions

1. ACTIVE OXYGEN CHEMICALS
2. HYDROGEN PEROXIDE
3. HIGHLY CONCENTRATED H_2O_2
4. PERACETIC ACID 40%
6. SODIUM CARBONATE PEROXIDE
7. ALKALINE EARTH METAL PEROXIDES
8. SODIUM PYROPHOSPHATE PEROXIDE
10. UREA PEROXIDE
11. POTASSIUM PERSULFATE
41. BECCO H_2O_2 35% HP
42. BECCO H_2O_2 35% FORMULA D
45. SODIUM PERBORATE
46. CONCENTRATED H_2O_2
49. AMMONIUM PERSULFATE
70. BECCO HYDROGEN PEROXIDE 98%

Properties, Reactions, etc.

24. ANALYSIS OF ALIPHATIC PERACIDS
34. USES OF PERSULFATES A BIBLIOGRAPHY—PART I
40. EQUIPMENT FOR USE WITH HIGH-STRENGTH HYDROGEN PEROXIDE
55. STABILITY OF PURE HYDROGEN PEROXIDE
59. THE ANALYSIS OF H_2O_2 SOLUTIONS
62. HYDROGEN PEROXIDE VAPOR
68. USES OF PERSULFATES A BIBLIOGRAPHY—PART II
87. THE BEHAVIOR OF THE GLASS ELECTRODE IN HYDROGEN PEROXIDE SOLUTIONS
93. ANHYDROUS HYDROGEN PEROXIDE AS A PROPELLANT

fmc
FOOD MACHINERY AND CHEMICAL CORPORATION

BECCO Hydrogen Peroxide

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION

Becco Chemical Division

General Sales Offices:
161 EAST 42nd STREET, NEW YORK 17, N. Y.

Technology
Newsletter

CHEMICAL WEEK
July 15, 1961

Titanium dioxide will be produced via continuous leaching and hydrolysis in a 6,000-tons/year plant currently under construction by Continental Titanium Corp. (Montreal). The process, which avoids the batch methods of major producers in the U.S., utilizes pressure (about 300 psi.) and higher temperatures (492 F) to dissolve the titanium from its ores and to control subsequent crystal formation during the hydrolysis step. Studies made on a prototype of the equipment indicate that the process can reduce production costs for titanium dioxide by 20-25%. Although Continental Titanium disclosed the process last year, it withheld details pending further studies and the recent issuance of Canadian patent 610,334.

•

Radiation processing of textiles is moving ahead overseas. That's the conclusion to be drawn from word that General Electric's X Ray Dept. (Milwaukee) has sold two electron-beam resonant transformers to undisclosed foreign buyers for research and pilot-plant textile irradiation. Up to now, economic hurdles have prevented radiation techniques from finding a place in improving surface characteristics of synthetic fabrics and fibers (e.g., dyeability).

•

Watch for major changes in floor polish formulations in the near future. Several companies have developed new acrylic-based copolymers that convert floor polishes from alkali-soluble to acid-soluble products. Upshot: it will be possible to scrub floors with detergents without removing polish or damaging gloss. Major polish marketers should be out with products embodying the new concept within the next few months.

•

Investment in basic research at colleges and universities and in science and engineering education will have to grow from fiscal '61's $3 billion to at least $8.2 billion in fiscal '70, according to the National Science Foundation. In a newly released policy statement called *Investing in Scientific Progress,* NSF analyzed scientific education trends of the past 40 years and projected them to '70.

The current $3-billion figure is made up of $2.1 billion for education and $0.9 billion for basic research at colleges and universities; the $8.2 billion foreseen for '70 would consist of $5.5 billion for education and $2.7 billion for basic research. The '61 total for basic research in all U.S. laboratories is reported as $1.8 billion—50% conducted by colleges and universities, 7% by other nonprofit institutions, 25% by industry and 18% by the federal government. Funds were supplied in the following ratios: 60% from government, 22% from industry, 12% from colleges and universities and 6% from other nonprofits.

Professional staff requirements for colleges and universities in '70 are seen as 175,000 for education in science and engineering (up from 100,000 in '61) and 85,000 for basic research (up from 45,000). And annual investments of up to $180 million will be needed in '70 for

adequate research equipment for college science laboratories, according to the report.

•

The Soviets have purchased an English computer for process control. A complete Panellit 609 information and computer system incorporating an Elliott Brothers Ltd. 803 solid-state computer has been purchased for a Soviet chemical plant (process undisclosed) by the soviet Committee for Complex Automation in the Chemical Industry. The purchase followed an equipment exhibition at the recent British trade fair in Moscow (*CW June 24, p. 165*).

•

Acrolein is trying out for a new role—as a slimicide. Shell has been supplying the material for testing by a number of Canadian paper mills, which haven't yet reached any conclusions about its effectiveness and safety.

•

Antihypertensive compounds without diuretic effect have been prepared by researchers at Schering Corp. (Bloomfield, N.J.). The materials are related to conventional benzothiadiazine diuretics, but do not have a sulfamyl group on the benzene ring as do the diuretics. First such compound in the series is 7-chloro-3-methyl-1,2,4-benzothiadiazine-1,1-dioxide. Schering reports, in the June 30 issue of *Science*, that it is synthesizing and biologically evaluating an extensive series of these compounds. The development is covered by U.S. patent 2,986,573.

•

A new process for stearic acid is claimed by the Wilson-Martin Division of Wilson & Co., Inc. (Philadelphia). Patented under U.S. 2,985,-674 and available for licensing, the process features the use of ordinary distillation techniques to achieve "double" and "triple pressed" eutectic stearic acids. The new technique reportedly eliminates the time-consuming "hot pressing" step of conventional processing.

•

Abatement in the latest 10-year rise in gasoline octane ratings is seen in the newest annual survey of the subject by the Interior Dept.'s Bureau of Mines. Research octane averages for regular gasoline rose one tenth of a point to 91.9 this winter, but premium gasoline stayed level at 99.2 and super-premium dropped one tenth to 101.4.

•

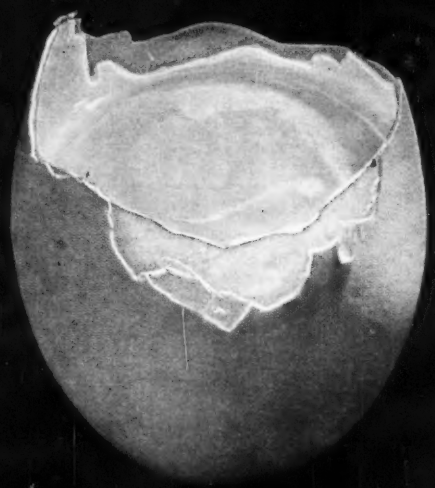
Most advanced CPI computer set-up outside the U.S. That's how observers described Huels AG just-installed computer center at Marl, W. Germany. The set-up includes a four-channel IBM 7070 with eight IBM 729 magnetic tape units and two IBM 1401 data processing units, will handle scientific and engineering jobs as well as process a full variety of business data.

•

A supersensitive air-polution detection device has been developed by General Electric Co. Also aimed for use in weather forecasting and in analysis of radioactive particles, the detector has a sensitivity of one part in a quadrillion (a million billion).

New Exclusive Plax Liners

SOME PRODUCTS NEED EXTRA PROTECTION



Egg membranes form a protective inner sac around the egg's vital liquids. And now Plax builds exclusive inner liners into plastic bottle "shells" for hard-to-package liquids. These liners inhibit permeation and extend shelf-life for many pharmaceutical, cosmetic and drug products. Liquids that never could use plastic containers before can cash in on plastic's good looks, light weight and bouncy durability. This inner liner principle, coupled with the adaptability of Plax containers, could well apply to your products. Send for free booklet 'A' to address below.

PLAX

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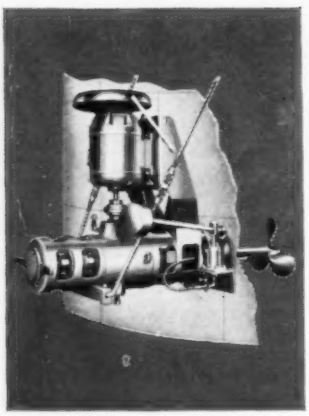
PLAX CORPORATION, HARTFORD, CONN. • In Canada: Plax Canada, Ltd., Toronto

NEW



for mixing

Beginning today, all other side-entering mixers are out of date. ¶ The LIGHTNIN Mixer you see here is a 50-horsepower Hi-Flo unit. It does the work of *three* 25-hp mixers on a big blending tank. ¶ It saves you one-half the purchase price of three 25-hp mixers • almost two-thirds the installation cost • and one-third of the operating cost. ¶ You can now get LIGHTNIN Mixers like it in a *full range of sizes up to 50 hp.* This new line provides 50% more flow per horsepower than any other side-entering mixer. It is called LIGHTNIN Series NSE. ¶ At every size level, these units equipped with new Super-Pitch propellers provide extra pumping capacity. Capacity that translates into faster mixing or mixing at lower installed cost. ¶ For information, call your LIGHTNIN Mixer representative now. He's listed in Chemical Engineering Catalog and in the yellow pages of your telephone directory. Or write, wire, phone us direct for Bulletin B-526.

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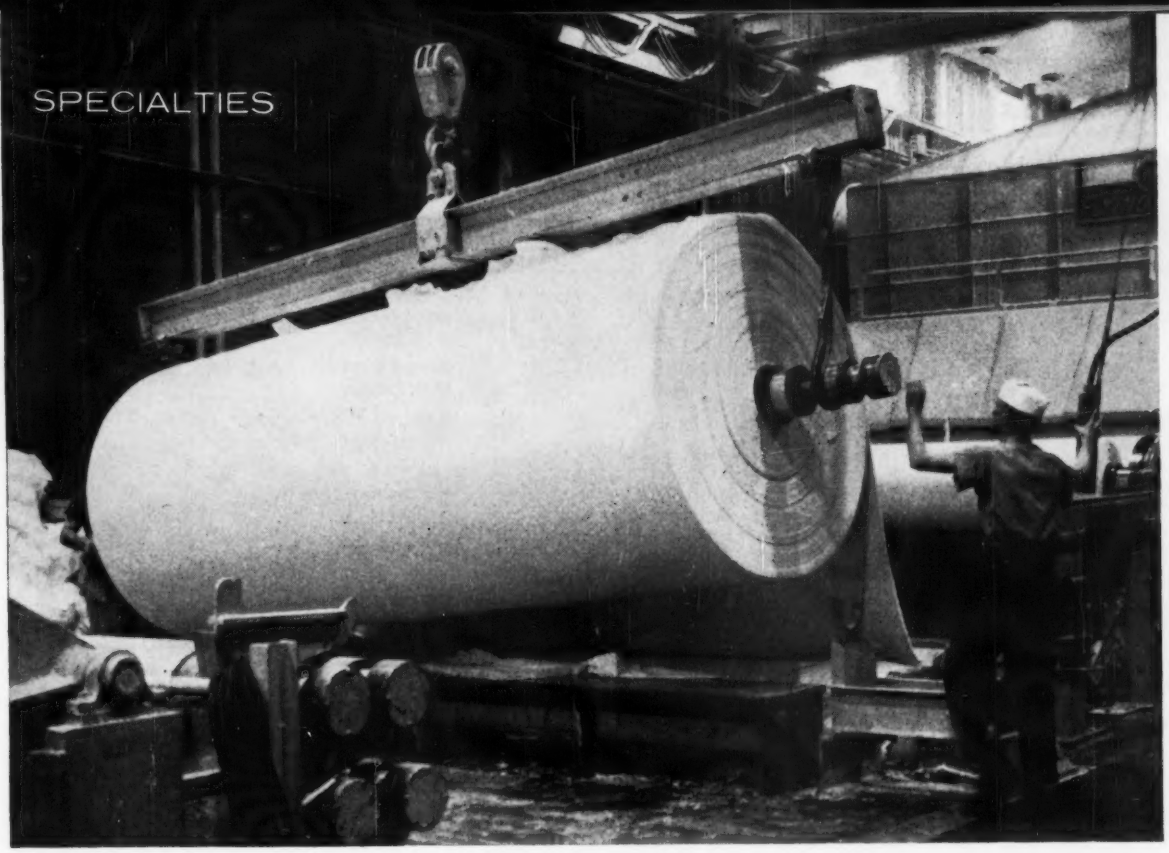


Special Report

Paper: Specialties Challenge

Paper profits can be real profits for the chemical supplier who fills papermakers' special needs.

In the high gloss cover stock used in this week's CW, or in the wet-strength paper used for yesterday's paper towel, specialty chemicals play an important role. Enlarging this market presents a double challenge to the chemical industry. First, it must make technological advances. But just as important, it must make gains in persuasion—in convincing paper producers, who have long favored mechanical modifications, of the worth of chemical products.

Not that chemical additives and coatings are not already widely used. Specialty papers—ultra-glossy boxboard, planographic printing plates, magnetic tapes, release papers, "knitted" paper—have won a strong position in the U.S. economy, even though they command premium prices. They run from 30¢/lb. to $1.50/lb., well above the 7-30¢/lb. tabs for newsprint and book papers. It's these relatively high paper prices, of course, that permit manufacturers of such specialty papers (sometimes called utility or technical papers) to readily pay $3/lb. for chemicals.

And chemical coatings and additives also are making their mark in more common papers. A good quality uncoated book paper may cost the printer $450-$500/ton; the same paper stock, bearing one or two coatings (needed for highest fidelity of half-tone-reproduction) may cost him well over $600/ton.

Coating Call: The surge in demand for coating materials is illustrated by the approximate tripling of coated paper output in the past decade—from some 2 million tons in '50 to about 6 million tons in '61. Production of on-machine* coated printing papers alone has increased nearly seven-fold since the early '40's. Coating are perhaps the papermaker's chief wedge into new markets.

But this market is only now being fully realized, declares John F. Thurlow, vice-president and co-owner of Gorham Laboratories Inc. (Gorham, Maine), pulp and paper processing consultants. The following survey article draws heavily on Thurlow's special knowledge.

Old Timers: Starch and protein adhesives and white pigments (clays) comprise the bulk of the present coatings market for paper. (Even non-coated paper—essentially cellulose fibers—often contains small amounts of starch, resin size, pigment fillers.) Starch is by far the top volume adhesive item; usage estimates range from a low of 120 million lbs./year to over 200 million lbs. Estimates for casein consumption range from 35 to 67 million lbs./year. And the best figure for soy protein appears to be about 35 million lbs. yearly.

Demand for clays is much heavier—it runs around 3.5 billion lbs./year. Calcium carbonate and titanium dioxide, though growing as competitive materials for clays, are still far back. Titanium dioxide consumption is about 150 million lbs./year and cal-

* A term for coating done on the paper making unit itself, rather than in a separate machine.

Typical papermaking adhesives; how they're used, how they stack up

Adhesives	*Pounds to bind 100 lbs. of clay*	*Advantages*	*Disadvantages*	*Approximate price/pound (dry)*
Casein	**12-15**	**Easily waterproofed**	**Uniformity sometimes poor; price may fluctuate widely; brittle film**	**16-24¢**
Soybean protein	**13-16**	**More uniform than casein**	**Brittle film; may be darker color than casein**	**20-23¢**
Starches	**18-25**	**Low cost**	**No truly effective waterproofing treatment; brittle film**	**8-14¢**
Latexes:				
Butadiene styrene	**12-15**	**Flexible film, good gloss, improved printability**	**Costs more than starch**	**30¢**
Acrylics	**10-15**	**Strong, flexible film, good gloss, improved printability, strength**	**High cost**	**50¢**
Polyvinyl alcohol	**3-5**	**Very strong film; flexible if plasticized**	**High cost; makes coatings viscous**	**57¢**

cium carbonate roughly 400 million lbs./year.

The heavy volume natural polymer products e.g., starch, are beginning to feel some competition, albeit small, from some of the synthetics. Though natural latex was used experimentally in paper applications several decades ago, the real surge of interest in latex resulted from the government's wartime synthetic rubber program.

Butadiene-styrene—the least expensive of the paper-coating latexes—is now widely used in paper and board coatings. The market for high-styrene material is now estimated to be at least 18 million lbs./year.

Acrylics are used when extra strength and gloss are required. However, their relatively high cost has been largely instrumental in keeping demand down to roughly 20% (3.6 million lbs.) of the butadiene-styrene level.

Polyvinyl acetate has good properties but its price in paper-useful form is even higher than the acrylic's; hence it remains in third place in the latex running with demand variously estimated at 1 to 4 million lbs. yearly.

These latexes are used either alone or in combination with less costly protein and starch adhesives. They are of particular utility in manufacture of papers for offset printing and in coated containers and boxboard which must print reasonably well, must often have a high gloss finish.

The latexes are also used to improve flexibility, dimensional stability and strength. In addition, latexes are used to saturate the fibrous materials of technical products (e.g., gasket board, oil resistant paper) and in boards which must exhibit both strength and flexibility.

Hidden Markets: The need for "finishing" chemicals such as pigments and latexes are not hard to see. There are, however, a host of other chemical needs that are not so obvious—except to paper producers themselves. Some of these are materials that are hard to detect in the final product; others are employed in manufacturing processes and don't necessarily show up in the final products.

Some examples: processing aids such as defoamers, retention aids for pigments, dyes and pulp fines, pitch dispersants and slime control agents.

Chemicals that add product quality include strength producers, sheet formation improvers and coating additives (such as leveling agents in high-solids coatings, varnish and ink hold-out agents, anti-static agents, and others).

It's this product area—rather than starch or pigment replacements—that promises the most new outlets for specialties chemicals. These chemicals are going to find growing use in the variety of new specialty papers being developed, as well as in the upgrading of existing paper products. There are a number of the low-tonnage paper products (offering special properties), which, while initially not too tempting as an outlet for chemicals, could develop into large-volume items in the next five or ten years (*see chart, p. 82*).

It has happened before. Urea and melamine-formaldehyde resins were not used by the paper industry until the early forties; consumption in '60 exceeded 30 million lbs.—with some experts putting the volume as high as 40 million. Sales of the synthetic latexes is now about a $7-million/year business, and most of the growth has come in the last 5-10 years.

Know the Need: Anyone wanting to go after the paper coating business will have to search out the particular areas in which his products satisfy the papermaker's needs. Papermakers traditionally do not turn to the chemical industry for help with product and processing problems. They usually look for a mechanical rather than a chemical solution. Faster and wider machines, improved pumpers, better driers, etc., are first thoughts. The training of potential supervisory personnel still leans heavily toward production and engineering technology. Queries to papermakers about their chemical needs in most cases brings in only requests for cheaper or more efficient versions of currently used, large-tonnage items.

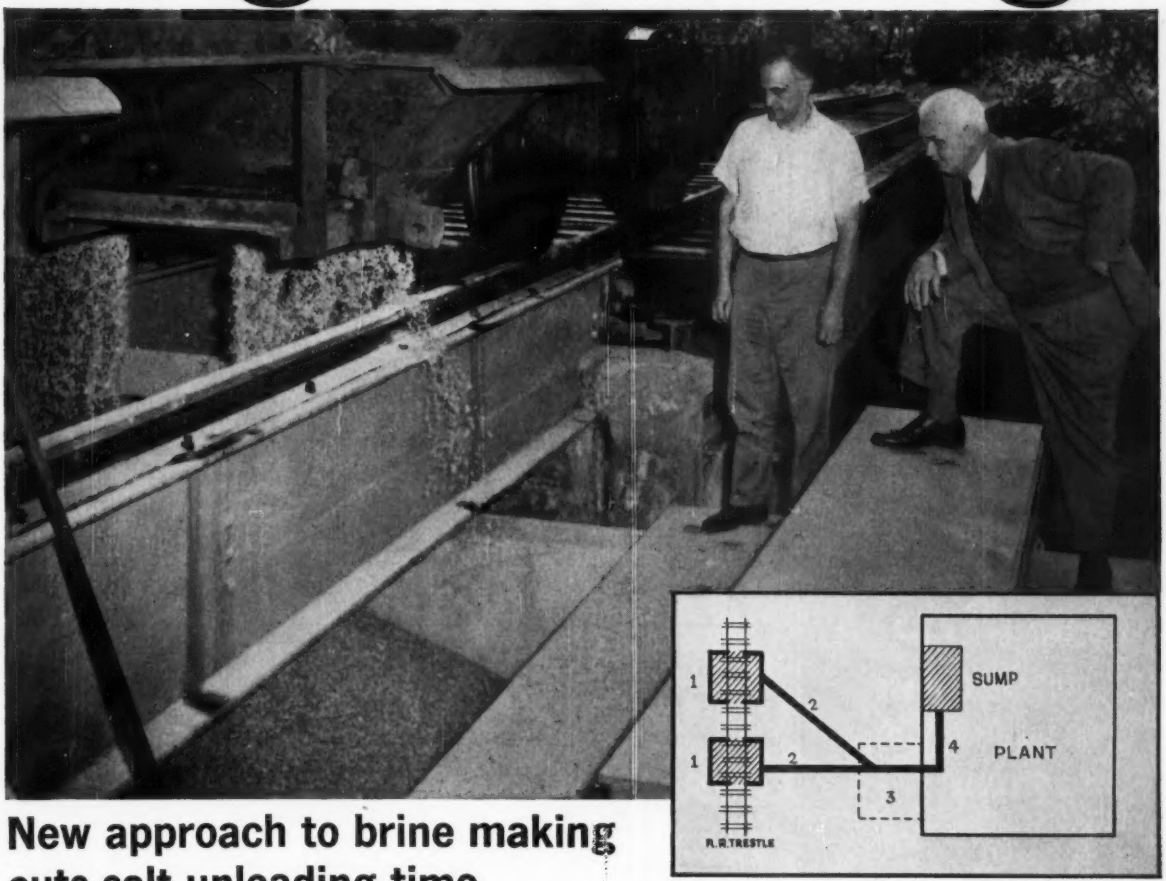
Papermakers, however, are beginning to learn that chemicals added prior to sheet formation can produce almost instantaneous effects in the process—effects that mechanical controls of machine operation and pulp preparation often take minutes or hours to produce.

These time savings become important when the paper product may be moving through machines at a 2,000 ft./minute clip. And there's a strong trend toward printing at higher speeds with larger sheet sizes of lighter-

Three examples of specialty papers: what they do; what goes into them

End-Use	*Properties Sought*	*Chemicals Used*
REPRODUCTION PAPERS		
Planographic plates (for offset printing)	Excellent wet strength and dimensional stability; surface chemistry carefully controlled for correct oleophilic-hydrophylic balance; special plates may be light sensitive or may be designed for integration with other reproduction processes	Casein and latex adhesives, clay pigments, polyvinyl alcohols, polyvalent metal salts, carboxymethyl cellulose, wet-strength resins, acetic acid, copper thiocyanate, carbon black, diazo compounds, hydroxyethyl cellulose, zinc oxide, silica and silica gel, polyvinyl acetate and plasticizers, microcrystalline waxes, formaldehyde, silicone resins
Verifax copy paper	Controlled absorbency; absence of curl after becoming damp; must be white	
Electrofax paper	Ability to hold static charge and to discharge rapidly on exposure to light	
Hectograph paper (masters and copy)	Must give up ink to the Hectograph gelatin and must receive ink in making copy; controlled absorbency	
Thermofax copy paper	Sensitive to imaging by heat	
Carbonless copy paper	Imaged as a result of pressure or blow	
Facsimile paper (for wire or radio messages)	Must receive image under the electrical scanning stylus	
RELEASE PAPERS		
Separator sheets for packaging rubber products	Low cost; ease of release	Metal stearates, waxes, silicones, polyethylene, pigments and adhesives, proprietary items such as Du Pont's Quilon (chrome complex in isopropanol) and Hercules' Aquapel (alkylketene dimers)
Backing sheets (adhering lightly to rubber adhesive goods—i.e., Holland cloth substitute)	Ample strength; no transfer of surface treatment to rubber goods	
Vinyl release paper (for manufacture of printed vinyl sheeting; paper is printed, film is cast on the sheet, which is then stripped off, leaving printing on vinyl film)	Good printing surface, accepts but does not hold ink; strong sheet; white or near white	
Press-release paper (used to make vinyl tile—prevents sticking of tile to press)	Low cost; ability to release when hot	
Carrier release (for back side of vinyl tiles in transit, storage)	Must not develop film adherence during storage	
Decal (base paper usually coated and having a wheat starch coating over the insoluble clay casein coating)	Sheet and coating (except wheat starch) must be water resistant	
PACKAGING PAPERS		
Soap wraps	Good water and mold resistance; good printability	Usual adhesives and pigments, sodium pentachlorophenate and numerous other antifungal agents, thermoplastic resins and plasticizers, sodium nitrite, urea, sodium benzoate, ammonium naphthenate, waxes, polyethylene, dyestuffs
Heat-seal labels	Front side must have good printability and may need to be waterproof; back must become tacky under brief exposure to heat—must remain tacky for few seconds when heat is removed	
Anticorrosion wrap	Color often unimportant; must impede corrosion and tarnishing of silverware, metal parts; must repel water	
Moisture vapor barrier paper (for frozen-food packaging)	May need to be grease resistant; resist passage of water vapor; may need good printability; no toxic constituents allowed; coating must not lose strength in wet environment	
Box wrap (form covering pasteboard gift boxes and consumer packages)	Flexibility; good printability; attractive by use of colors or embossing; coating should be scuff-resistant	

salt engineering



New approach to brine making cuts salt unloading time 32 man-hours per car

Pipes (2) deliver brine from new 55-ton Lixators (1) to existing pipe line (4) that served old Lixator (3). New construction made maximum use of existing installation—did not affect railroad trestle or plant interior.

At this N. J. plant Sterling Rock Salt used to be unloaded manually into a chute feeding a brine tank located ten feet from the tracks. Cost of the operation: an expensive 32 man-hours per car. Furthermore, the 60-ton brine tank had to be exhausted down to ten tons before another 50-ton carload of salt could be added, creating problems of reserve and scheduling.

An International Salt Company Technical Service representative and the plant manager solved the situation by installing two 55-ton Sterling Storage Lixators under the existing railroad trestle. Salt drops directly from the hopper cars into them. Gravity supplies the labor, releasing the 32 man-hours. And when the Lixators* get down to 30 tons each, a 50-ton carload tops them off with 25 tons apiece. Ordering is simplified, and the buyer never has to worry about reserve. And how does the salt get to points of use? Simple. The Lixators produce crystal-clear, fully saturated brine *automatically*. Pipes carry it into the plant.

Local contractors competed for the job by sealed bids estimated from complete plans supervised by International's Technical Service Department.

This project is a good example of how International salt engineering can benefit salt users. If you're interested in unequaled technical assistance on any phase of salt handling, storage or dissolving, write International Salt Company, Clarks Summit, Pa., or nearest district office.

*Registered T.M. International Salt Company

BOSTON CHARLOTTE CINCINNATI NEWARK NEW YORK PITTSBURGH
BUFFALO CHICAGO DETROIT NEW ORLEANS PHILADELPHIA ST. LOUIS

INTERNATIONAL STERLING SALT SALT COMPANY

"A STEP AHEAD IN SALT TECHNOLOGY"

weight papers. The precision needed to turn out these products at economical rates will soon compel the paper manufacturer to seek more processing control through fast-acting agents.

Among the continuing pressures in this direction is the call for lighter-weight paper for printing and wrapping. New materials should have qualities (strength, opacity, handling qualities) equal to or superior to presently used paper, which may be 5-10 lbs./ream heavier.

In printing-grade papers, the struggle has been to boost opacity while simultaneously increasing brightness and perhaps decreasing sheet weight and thickness. One result of the search for these properties has been increased use of calcium carbonate and titanium dioxide—singly and in combination to improve reflectivity and opacity.

Development of higher gloss has been a major requirement in certain packaging and printing grades of paper, and has been achieved by calendering, cast-coating and to some degree, brushing.

More notable is the so-called cast-coating process in which freshly applied coating is dried in contact with a highly-polished, chromium-plated drum, which imparts the smooth, gloss surface to the coated paper.

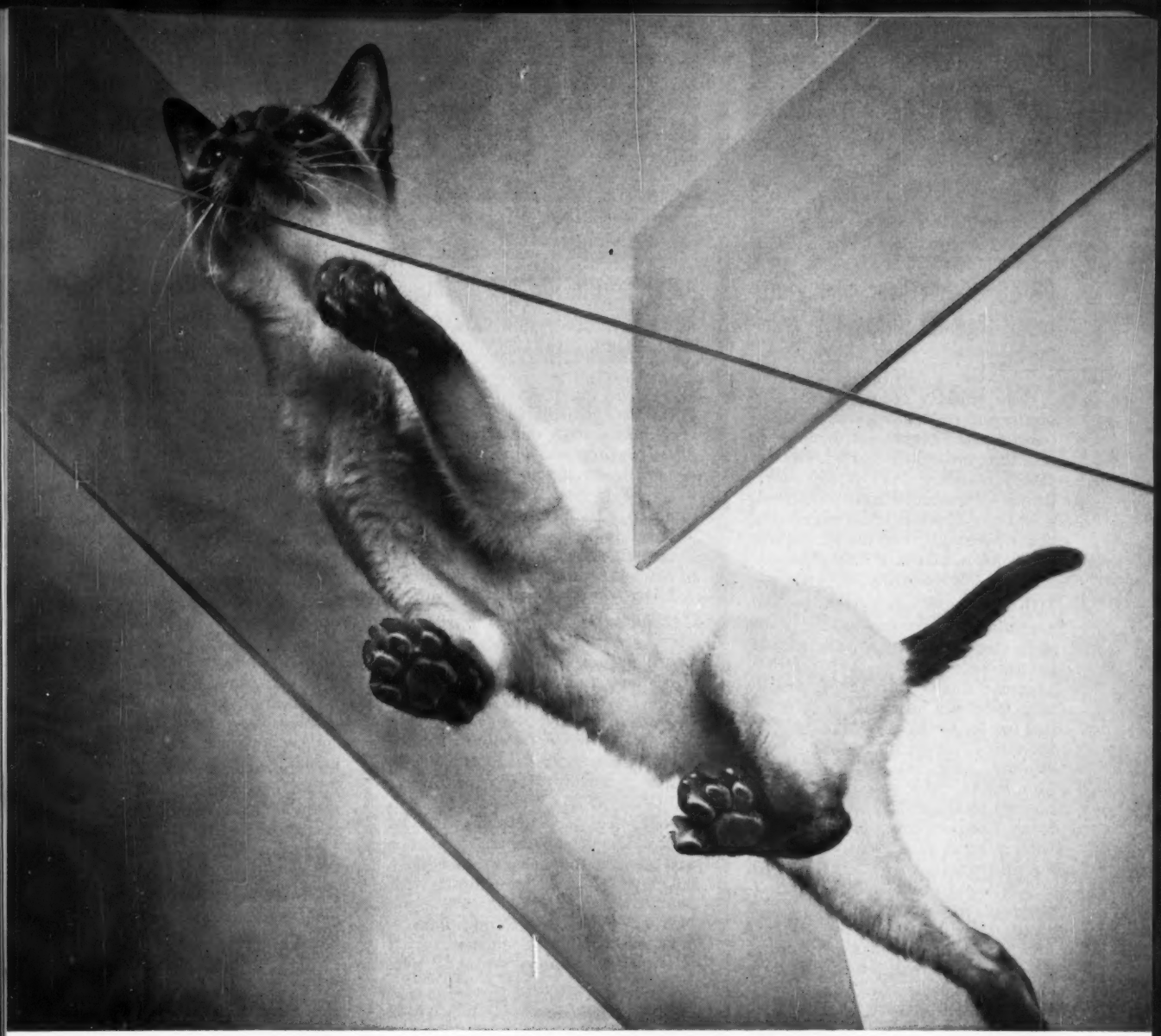
Chemical technology should become an increasingly essential factor in another area—development of pigments of superior brightness, hiding power and minimum need for adhesives, plus rheological properties needed for use in fluid coatings.

Chemistry is also scoring in development of synthetic adhesives of excellent binding power and finishing gloss (gloss development) characteristics.

Reclaim Fibers: An area to which chemical specialties makers can look for enlarged future markets in the paper industry concerns reclaimed fibers. This market is developing as fibers treated with the newer additives

Typical specialty chemicals used in papermaking

	Uses	*Price/pound*
Aldehyde-starch	Wet strength	$1.00
Alkylketene dimers	Alkaline sizing	$1.30
Acrylate emulsions	Adhesive in coatings	50-60¢
Butadiene acrylonitrile latexes	Adhesive in coatings	50-60¢
Butadiene-styrene latexes	Adhesive in coatings	27-35¢
Colloidal silica	Antiskid surfaces, scuff resistance, improved adhesion	50¢
Methyl cellulose	Coatings, sizing, thickening agent	70¢-$1
Organic titanates	Adhesion promotion	$3- 4
Pearl pigment (synthetic)	Decorative coatings	$7- 9
Polyvinyl acetate latexes	Adhesive in coatings	40-50¢
Pyridyl mercuric acetate	Slime control	$8
Quarternary ammonium compounds	Softening of tissues and towels, slime control, surgical sheeting	$1-1.70
Silicone resins	Release papers, xerographic printing surfaces	$4-5
Stearato chromic chloride	Waterproofing, release papers, insolubilizing coatings	$1.80-2.40



Clearer Rigids?

Where the problem is to create clearer rigids—with excellent stability and at low cost—the answer is Mark 99.

This new Argus stabilizer supplies superior heat and light stability. It also eliminates the problems of cross-staining and offensive odor that occur when more costly tin mercaptide systems are used.

Is your present objective clearer rigids? Low temperature flexibility? Non-toxicity? Good air release and bubble break in plastisols? More economical stabilization of electrical compounds?

Whatever your vinyl problem—*check with Argus.* If we don't have your answer in our present Mark stabilizers and Drapex plasticizers, we'll research it for you in our lab.

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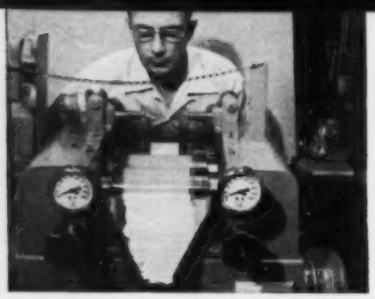
Rep's.: H. M. Royal, Inc., 11911 Woodruff Ave., Downey, Cal.; Philipp Bros. Chemicals, Inc., 10 High St., Boston; H. L. Blachford, Ltd., 977 Aqueduct St., Montreal. European Affiliates: SA Argus Chemical NV; 33, Rue d'Anderlecht, Drogenbos, Belgium—Lankro Chemicals, Ltd.; Salters Lane, Eccles, Manchester, England.



HB-40®...low-cost, highly efficient pigment disperser–grinding aid.

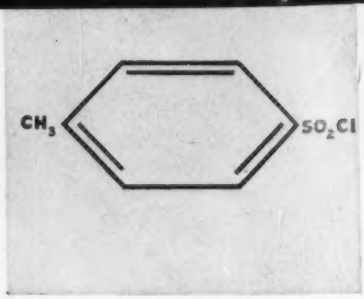
HB-40 rapidly converts dry pigments into readily dispersible, highly concentrated paste...at much lower cost than most dispersants. It's practically colorless (APHA 150 max.), grinds to true color values, has only a whisper of odor. It's a big, bulky, shear-resistant molecule with a boiling point in excess of 325° C., assuring low, low volatility.

HB-40 "holds" an extremely high percentage of pigment and the pastes strip clean from the rolls or blender ... are smooth and workable. HB-40 pigment dispersions blend readily with virtually all resins in commercial use for coating, casting, or slush molding ... including vinyl, alkyd, styrene, nitrocellulose, ethyl cellulose, PVAc, chlorinated rubber, and methyl methacrylate resin formulations. The miscibility of rubber latex with mineral oil is greatly improved by adding 15 to 30% of HB-40. 2% HB-40 in high-melting asphalt-molding compounds imparts a high gloss. HB-40 "flexibilizes" asphalt and Gilsonite-based maintenance paints. It improves the electrical resistivity properties of PVC compositions plasticized with DOP. HB-40 adds important "plus" properties, at low cost, to many formulations. Perhaps to yours, too.

DIETHYL PHTHALATE...formulates low-cost, nontoxic adhesives and coatings.

Concerned about the new Food & Drug laws relating to food packaging? Monsanto's diethyl phthalate offers coatings and adhesives makers a plasticizer with several advantages: it is low in cost, makes extremely quick-tack PVAc emulsion adhesives ... and it has been accepted as "nontoxic" both by the U. S. Bureau of Animal Industry and by the Food & Drug Administration.

Typical uses of diethyl phthalate-plasticized adhesives include boxboard manufacture, sealing tapes, envelope adhesives, and adhesives for food wrapping film. Only 11 parts diethyl phthalate per 100 parts Gelva®-55 (polyvinyl acetate) emulsion makes a stable, quick-tack adhesive, with low-temperature flexibility of −5.0° C. (Modified Clash & Berg Test); a volatility loss of only 4.8% after 20 hours at 87° C.; and oil extraction weight loss of only 0.63% after 24 hours' contact with peanut oil. Diethyl phthalate is one plasticizer that best combines economy and formulating efficiency with fully approved safety of use. Try it.



para-TOLUENESULFONYL CHLORIDE...offers a 3-way cost advantage in chemical synthesis.

Monsanto's new process makes this intermediate one of the most "cooperative" and rewarding of all commercial chemical raw materials ... a versatile reactant for the step synthesis of a variety of organic chemicals.

HIGHLY REACTIVE: With extremely high reactivity at the chlorine atom, PTSC undergoes many replacement reactions with typical hydrogen-containing molecules such as alcohols, amines, reactive hydrocarbons, metal salts of acids ... in fact with almost any organic molecule containing labile atoms. PTSC thus offers multi-directional pathways to a host of profitable commercial chemical compounds.

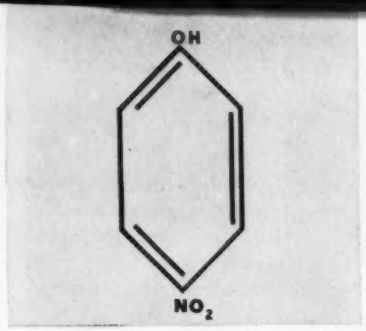
PURE: With a 98% minimum assay, PTSC assures predictable yields for the process, a minimum of troublesome contaminants.

STABLE: Though highly reactive, Monsanto high-purity PTSC can be stored the year round with negligible deterioration ... thus assuring better yields through cleaner reactions that are easier to predict and control. PTSC offers processing savings wherever sulfonic acid chloride reactions can serve in your product synthesis.

Monsanto Task Force Chemicals

Are you tired of getting whipsawed by the profit squeeze? Here are six Monsanto products that might help you push ahead of competitors. They're designed to lower materials cost, short-cut processing time, or "build in" plus values that command higher prices.

Monsanto offers you a whole task force of cost-cutting "quality improvers," including a complete line of fast-acting dispersants ... *seven* FDA-approved nontoxic plasticizers ... and a variety of high-yield intermediates, *heat-defiant* color stabilizers, low-cost resin extenders. Chances are, if your product is made by chemical processing, Monsanto can help you stretch your profit margin. We'll certainly welcome the opportunity to try.



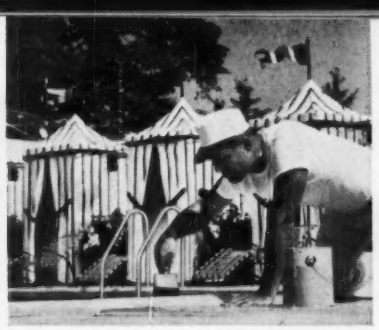
para-NITROPHENOL...high-assay intermediate can cut synthesis costs.

Monsanto *para*-nitrophenol can be a cost-saving base raw material for a number of specialized syntheses. PNP actually offers highest assay at lowest cost.

At 99.0% minimum purity, this high assay eliminates the loss of 3 to 4% water content of ordinary commercial material. The uniform level of concentration can make important money savings through easier, faster, more predictably uniform processing reactions. Used by itself, PNP is a low-cost fungicide and preservative for chrome-tanned leather. In syntheses, PNP offers a valuable reactivity for creating new structures. Its highly reactive phenol hydrogen atom gains an energizing "boost" from the *para* NO_2 group. This phenol hydrogen undergoes replacement by a host of reactive structures that may be derived from sulfonyl chlorides, alkyl halides, phosphoryl chlorides and many others. PNP offers organic chemists a low-cost combination of an OH and an NO_2 radical on an aromatic ring . . . a building block for new chemical structures for insecticides, dyes, and derivatives of *para*-aminophenol. Give your creative imagination a workout with PNP. Likely result: better end products at substantial savings.

SANTOWHITE® POWDER REFINED...controls oxidative degradation of caprolactam, polypropylene, and high-density polyethylene.

Santowhite Powder Refined stabilizes olefins against oxidative heat degradation that causes color build-up during processing and decreased flow properties. At concentrations up to 0.5%, the in-process and residual antioxidant action of Santowhite Powder Refined is almost equal to Monsanto's Santonox® . . . but its color-controlling mechanism is far superior. So, too, is its stabilizing action, compared with compounds such as di-*t*-butyl-*p*-cresol and other alkylene-bis-substituted phenols. For example, Santowhite Powder Refined, when used as an antioxidant for polypropylene and high-density polyethylene, protects these polymers from oxidation for 2.6 hrs. and 5.3 hrs. compared to 0.3 hrs. and 0.8 hrs. respectively for the unprotected controls (as shown by infrared tests on carbonyl build-up). In air oven aging tests, after three days at 150° C., polypropylene samples with Santowhite Powder Refined showed a weight loss due to decomposition of resin of just 0.42% compared with 20.6% loss for the controls. In polycaprolactam, Santowhite Powder Refined improves low-temperature brittleness and makes reprocessing easier by maintaining the melting point. For example, 1% on the resin maintains the melt index within 25% after two extrusions at 290° C., while the unprotected resin increases its melt index over 500%.



AROCLOR® oils and resins ...reduce cost of coatings and improve chemical resistance, adhesion, weathering.

Combinations of the various Aroclor liquids and solids offer coatings formulators an efficient way to conserve their base resin solids, yet *increase* the total resin content of their vehicle. At the same time, they can lower cost and improve properties of their coatings. The reason is simple. The highly inert Aroclor chlorinated polyphenyls, ranging from clear syrupy liquids to brilliant pale resins, are readily compatible with virtually all commercial coating resins . . . by simple mixing. They are low in cost . . . and they greatly improve the chemical resistance, weatherability, film strength, and adhesion to metal, wood, or masonry. In aluminum paints, for example, addition of an Aroclor resin promotes the adhesion and sealing properties. In traffic roadmarking, marine and swimming pool paints, color-fastness and chemical resistance are greatly improved. In epoxies, Aroclor resins will make the coatings fire-resistant. Aroclor resins exert a "permanent" flexibilizing action, are non-drying and completely inert. Because of their low per-pound cost and the simplicity of blending, the Aroclor resins usually can cut the cost of any coating compound in which they are used.

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MONSANTO CHEMICAL COMPANY
Organic Chemicals Division
Task Force Chemicals, Department 2763-Y
St. Louis 66, Missouri

Name.....

Company.....

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City.....*Zone*.....*State*.....

take a larger share of the reprocessing field.

As an example of how these new specialties complicate the reclamation field, heat-set inks and coatings containing rubbers and other plastic or resinous materials are far too adherent to be easily removed by the conventional pulping and washing processes. Nevertheless, manufacturers using the reclaimed fibers can't lower their standards. Reclaimers must either spend more time at conventional procedures, or find cheap chemicals that do a good job.

Permissible costs of reclamation vary from mill to mill and depend on the degree of de-inking needed, and source of the waste used. None of the chemicals now used in reclamation (alkalis, dispersants, solvents, bleaching agents) can be considered high-cost materials; hence this application for new chemicals appears at first to be unrewarding.

However, the field is definitely open to more effective approaches. Some possibilities: development of materials that preferentially absorb inks and thus cleanse high grade pulps, opening up markets for such pulps in more expensive grades of paper products; finding techniques for economical separation—perhaps through flotation or mechanical means—of groundwood fiber from more expensive, stronger types of fiber. Such means do not exist today, but would find ready acceptance by the pulp and paper industry, in mills using reclaimed fiber.

Computer Age: A development to watch closely is computer control of papermaking. International Business Machines is well along on work in this area. Reportedly, its computer-run units operate so quickly that paper's properties—e.g., its strength when wet—aren't good enough to take full advantage of this swift control. Hence, strength-producing chemicals will be in demand as computer-controlled processing becomes more widespread.

The Best Approach: Finding a product with potential in papermaking isn't the same as selling it. A major headache in selling paper chemicals is the job of finding materials that can be sold on an industry-wide basis. Outside of the almost universal call for simple filling and coating items, industry segments differ radically in their problems and chemical needs. Writing- or book-paper mills have far different problems than do mills that produce unbleached kraft. Moreover, tissue or newsprint mills often make no grades that require sizing, pigments or adhesives.

Even attempts to concentrate on narrow segments of the paper industry (e.g., kraft paper and board, food board, newsprint) may reveal perplexing situations.

For example, a defoamer that works well in one mill may be denounced as worthless by machine tenders in another mill located on the same river and making the same product.

A similar irksome situation may occur with virtually any chemical product sold to the industry—but it is more likely to crop up with materials added to the pulp slurry before the sheet is formed. Chemicals added later (in the size press, calender stack, coating applicators) are less subject to the vagaries of "art of use" and are more often handled by technically trained personnel.

Gaging the Future: Putting a dollar volume on the potential for coatings used to upgrade existing papers and the specialty papers that are now in research labs is nothing more than guesswork.

There is a measure, however, that market researchers can use: packaging trends. Packaging, one of the biggest outlets for fancy coating, is now estimated to be a $16 billion/year business in the U.S. In the next decade this field is expected to expand to more than $30 billion. Since paper products now have a substantial share of the total U.S. packaging market (about 42%, according to some) the future looks bright in that one area.

Resourceful chemical makers seeking to tap the papermaking market must learn the papermaker's problems, discover what mechanical innovations may be on the way and what new specialty papers are likely to be developed—or need to be developed.

Although substantial amounts of specialty papers are now being used—to insulate, shield, record, shape, cushion, separate, copy and conduct—the potential far outweighs present consumption. It's a clear opportunity for chemical research. The specialties maker who succeeds in this challenging field will find that paper profits are real profits.

2-NITROPROPANE!

The remarkable solvent that brightens the day for more and more hard-working formulators.

2-NP ($CH_3CHNO_2CH_3$) is an extraordinarily versatile member of the CSC Nitroparaffin family. Its most important property is its strong solvent power for a wide variety of materials including many natural resins, synthetic resins, coating materials, dyes, organic chemicals and fats and oils. Of special interest is the co-solvent effect of 2-NP and/or toluol and alcohol, making it an outstanding solvent for many vinyl resins and acrylics. It is a superior solvent for epoxies and cellulosics.

2-NP is to the newer coatings what butyl acetate has been to nitrocellulose – an ideal solvent. 2-NP's evaporation rate permits maximum flow and leveling without delaying drying time.

Unlike ketones, 2-NP in vinyls eliminates problems of solvent residue and solvent odor, too. It has several safety features such as relatively high flash point and a high lower-flammability limit of vapors in air. Write for all the literature that details how CSC's 2-Nitropropane can brighten your day.

Evaporation Rate of 2-NP Compared to Other Solvents (volume)

Acetone	975
MEK	568
Toluol	197
MIBK	186
2-NP	110
n-Butyl Acetate	100
Xylol	69
Cellosolve	38
Isophorone	4.3

Flash Points (°F Tag Open Cup) of 2-NP Compared to Other Solvents

Acetone	16
MEK	30
Toluol	56
MIBK	81
Xylol	85
n-Butyl Acetate	92
2-NP	103
Cellosolve	126
Isophorone	202

Comparison of Lower Limit of Flammability of 2-NP With Other Solvents (% by volume in air)

MIBK	0.9
Xylol	1.0
Toluol	1.27
n-Butyl Acetate	1.7
MEK	1.8
Acetone	2.15
2-Nitropropane	2.6
Cellosolve	2.6

NITROPARAFFINS DEPARTMENT

COMMERCIAL SOLVENTS CORPORATION

260 MADISON AVENUE, NEW YORK 16, N. Y.

OFFICES IN PRINCIPAL CITIES

PRODUCTS

New Size: General Electric (Waterford, N. Y.) is now marketing its RTV (room-temperature vulcanizing) liquid silicone rubber compounds in 1-lb. quantities. The previous minimum quantity was 1 gal. The price on 1-lb. orders ranges from $6-7.50/-lb., depending on grade.

•

Epoxy Adhesive: Allaco Products (238 Main St., Cambridge 42, Mass.) now has a rapid-curing formulated epoxy adhesive named Minit-Cure. It cures in 60 seconds at room temperature; infrared heat cuts curing time to 45 seconds. The system is formulated for rapid production-line work and can be used to bond metal to metal, plastic to metal, and plastic to plastic. An 8-oz. trial kit sells for $6.

•

Rust Preventive: An antirust and corrosion compound is being marketed by Ronco Laboratories (3617 Brownsville Rd., Pittsburgh, Pa.) under the name Ferro-Gard. It can be applied by brush, spray, dip or fogging, is sold as a light, oily liquid.

•

Foam-in-Place Kit: A complete system for foam-in-place urethane packaging is being offered by Leal Corp. (P.O. Box 53, Oaklyn, N.J.) under the name Pak-N-Foam. The package deal includes design consultation, automatic metering and dispensing equipment, and license (Freeman Chemical Corp. patents) to use the process.

•

Textile Resin: A reactive thermosetting resin, said to impart high shrinkage control and crease resistance to cotton and rayon fabrics, is being sold by Onyx Chemical Corp. (Jersey City, N.J.) under the tradename Onyxset A. It's recommended for production of wash-wear, drip-dry and permanent mechanical finishes, where chlorine retention is not required.

•

Silicone Mouthpiece: Siligard Co. (Chicago) is making custom-fitted athletic mouthpieces of silicone rubber. The product consists of a premolded mouthpiece made of silicone rubber, and a silicone paste. The wearer puts the paste in the channel of the premolded unit, so that an impression

of his teeth is made in the paste. The pastes cures in moments at room temperature. Wilson Sporting Goods Co. (River Grove, Ill.) is distributor.

•

Reactive Dyes: Sandoz Inc. (New York) has added four new Drimarene —Z reactive dyes to its line. The four: a yellow, a golden yellow, a navy and a bordeaux. All are designed for printing and pad dyeing.

•

Hot melt Adhesive: United Shoe Machinery Corp. (Cambridge, Mass.) has added two formulations of Thermogrip hot melt adhesive to its line. Identified as grades 311 and 312, they're intended for bonding foil to itself and to other metallic surfaces. Temperature limits are 0 to 150 F for 312, and —20 to 150 F for 311.

•

Size Binder: Polyfilm B-2, a binder for starch-based warp sizes for synthetic, natural and synthetic/natural fiber blends, has been put on the market by Polymer Industries (Springdale, Conn.). It's a water-dilutable solution of acrylic resin, can be added at any point in the size cooking cycle.

•

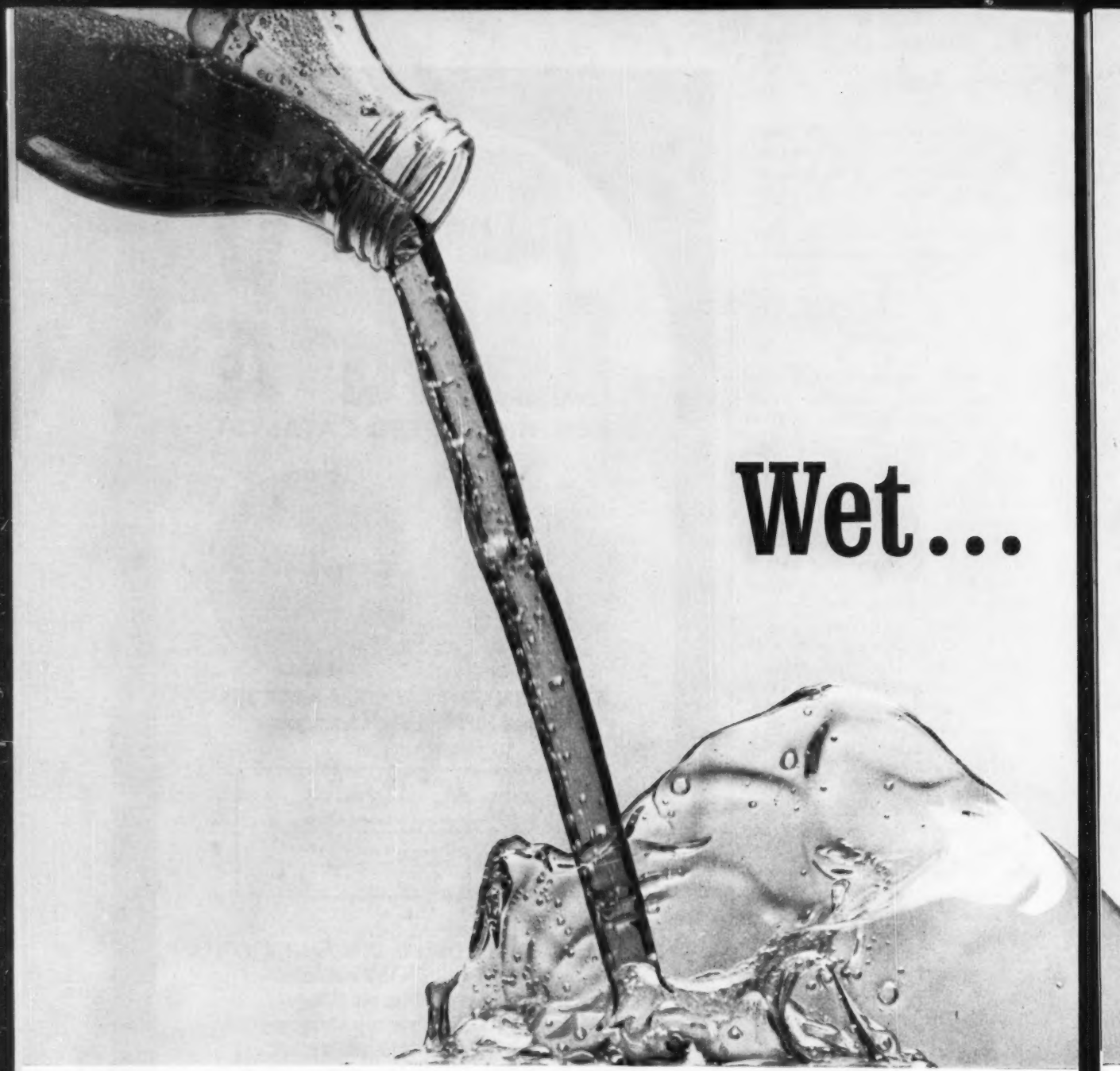
Urethane Odor Masks: The Noville Essential Oil Co. (1312 Fifth St., North Bergen, N.J.) has developed three types of masking agents for urethane foam. Two are intended to give the scent of freshly laundered linen to products such as foam pillows, matresses and fabrics. The third is intended to counter amine mal-odors.

•

Anti-Stick Agent: A fluorocarbon slip and anti-stick agent, originally introduced in aerosol form, is now available in pint (price $3.50) and quart ($6.00) liquid form from Dixon Corp. (Bristol, R.I.) It's called Rulon Liquid, can be applied by brush, spray, dipping, wiping or soaking.

•

Muscular Mortar: Raybestos-Manhattan (Bridgeport, Conn.) is now marketing a new cement for masonry. Called Raybestos Treadline Mortar, it's claimed to have five times the bonding strength of conventional mortars. The new material cures to moderate strength in 24 hours, reaches full strength in 72 hours. It is suggested for use in bonding concrete, cinder blocks and bricks. Raybestos has appointed some 34 local and regional treadline distributors.

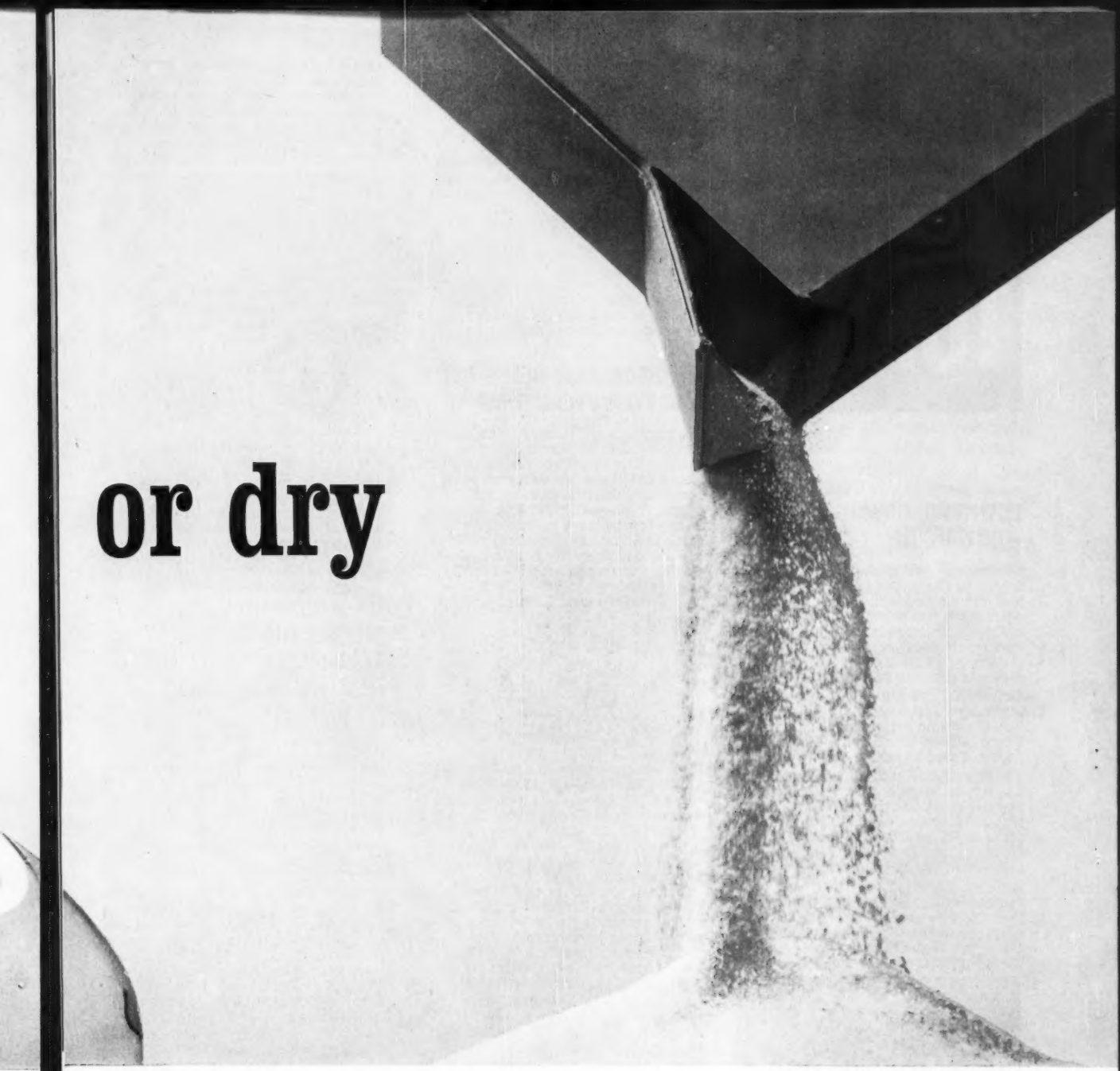


Heavy or light cleaning . . . industrial or consumer use . . .

Poly-Tergent® surfactants

Liquid and powder detergents are doing so many jobs these days, it makes sense to be sure the surface active agent you use is best for your product application. What's the big job to be done? Need an effective detergent? A dispersant? An emulsifier? A wetting agent? The extensive Poly-Tergent series of Olin surfactants gives you your choice to meet the specific need.

Poly-Tergent surfactants are produced from both aromatic and aliphatic alcohols, with different ethylene oxide contents to meet your specific formulation requirements. Because, for your product or process, one may be more effective as a wetting agent, another as a detergent, you'll find it helpful to have technical data on hand for all the Poly-Tergent surfactants. Personal assistance is also readily available. Simply phone or write your nearest sales office. OLIN MATHIESON, Organic Chemicals, 745 Fifth Avenue, New York 22.



or dry

assure effectiveness

Some uses for Poly-Tergent surfactants:

• Wetting and detergent action in industrial cleaners • Dispersants and emulsifiers of natural greases and oils • De-inking, de-pitching and other paper processing • Practically all phases of textile processing • Compounding agricultural emulsions • Stabilizing latex paint emulsions • Creating antistatic effects in handling polyethylene film • Wetting agents for fire fighting and dust laying • Sludge dispersant in fuel oils • Emulsion breakers for crude oil emulsions • Wetting agents (with HCl) in acidizing oil wells

ORGANICS DIVISION **Olin**

Ethylene Oxide • Ethylene Glycols • Polyethylene Glycols • Propylene Oxide • Propylene Glycols • Polypropylene Glycols • Ethanolamines • Glycol Ethers • Surfactants • Ethylene Dichloride • Propylene Dichloride

8930

ONE OF A SERIES OF CHATS ABOUT THE CONSERVATION AND CONTROL OF HEAT

SARCO TOPICS

DOWNTIME DOWN —OUTPUT UP

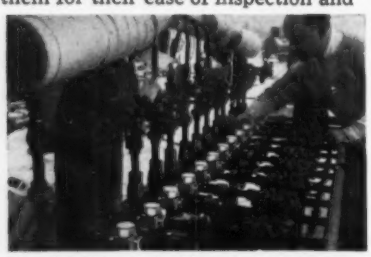
Continuous processing . . . two big words in the world of chemicals . . . and one big headache when the processing has to stop unexpectedly. It's not just the pure pain in the neck that mechanical failure produces. It's the production costs that keep mounting during down-time.

Let's face it, no one can eliminate every bug. But steam trap failure is a bug there's no excuse for. Not since Sarco created the Thermo-Dynamic Steam Trap, Type TD-50.

For example, Reichhold Chemicals know how bugless it is. They have standardized on this unique steam trap in their new Maleic Anhydride plant at Elizabeth, New Jersey. Of their 320 TD-50's, most are in service on 35-lb. steam tracer lines.

Results? Results!

For one thing, Reichhold has learned that TD-50's hardly know the meaning of the word downtime. Then, too, maintenance people like them for their ease of inspection and service. And TD-50's don't require high quality steam to function.



The character pretending to inspect one of Reichhold's TD-50's is Sarco's ad manager, who normally wears a gray flannel suit. We're happy to see strainers used properly on this 14-trap manifold to protect the steam traps, even if they don't happen to be Sarco strainers.

We don't want to sound like an advertisement, but it's this way: the TD-50 is so simply designed it has only one moving part; its performance is uniform; it operates equally well on heavy, light, or no condensate load — even against back pressures up to 50% of inlet pressures; it's so rugged that superheat, water hammer, vibration, or corrosive condensate won't affect it; if you should ever want to service a TD-50, a highly unlikely prospect, you can unscrew the cap, clean it, blow it down, and have it back on stream in 40 seconds.

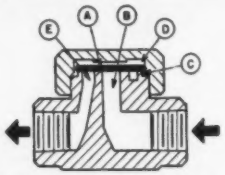
MR. BERNOULLI HELPS BUILD A BETTER STEAM TRAP

We may be a trifle tardy in bringing it up, but Daniel Bernoulli, who dreamed up the "Bernoulli Effect" about 250 years ago, deserves some sort of accolade from us here at Sarco. A plaque perhaps, or his name in the foyer floor tile. Daniel was a famous Swiss mathematical genius and he was probably a little hesitant about even mentioning his slightly offbeat discovery, the "Effect," in *Hydrodynamica* (1738).

If you happen to have a spool handy, you can perform the simple "effect" right at your desk. Lay a cardboard disc with a pin through it on the table. Place the spool over the pin and blow—hard—and lift. The disc won't fall until you stop blowing because the air under pressure expands between the end of the spool and the disc. The pressure in this space is actually less than atmospheric, and the sum of the downward forces is less than the upward force of atmospheric pressure acting upon the disc's bottom side.

Well, of course it *sounds* rather remote, but what seemed like a simple parlor trick to Bernoulli has made it possible for us at Sarco to solve steam trapping problems by the dozens. In our Sarco Thermo-Dynamic Steam Trap, Type TD-50, the cardboard disc is replaced by a stainless steel disc A, the spool tube by inlet tube B. The disc also acts as a valve and can seat on B, and also on outer seat ring C. When seated, the disc seals the inlet and the chamber D from the outlet E.

Full attention now, because it could easily be *your* steam, condensate, or air we're following here as it enters the trap, its pressure raising the disc and allowing fluid to flow radially across the underside of the disc. The velocity of air or condensate is comparatively low, exerting little influence on the disc, which remains



clear of the seat, allowing free discharge. Ah, but now steam enters the trap. Velocity increases greatly because of the steam's greater internal energy. Presto! The disc is pulled toward the seat just as was the cardboard. At the same time, the radial steam jet raises the pressure in D by recompression, snapping the disc down on the seat.

Downward force of recompressed steam in D, acting on the full area of the disc, is greater than the upward force of the inlet steam acting on the smaller area of the inlet orifice. So the disc remains seated, stopping all flow of steam, until pressure in D is reduced by condensation, and the cycle is repeated.

BEYOND THE TD-50 PRINCIPLE

Surprise! In spite of the one-track subject matter you've had the decency to ingest so far, we manufacture a good deal more than TD-50's. As a matter of proud fact, we are the only company that makes and sells all five types of steam traps. After all, there is a place for Balanced Pressure Thermostatic, Float Thermostatic, Camlift Bucket, and Liquid Expansion Thermostatic Steam Traps too. And our knowledgeable engineers can tell you exactly where to use what—and how.

And may we modestly add, that's only the beginning? As long as our present conversation seems to consist of product name dropping, we'll just mention the fact that we make exceptionally fine pressure and temperature regulators of rather astonishing variety and ingenuity. For example, we have a complete line of self-powered regulators for heating and cooling. And to make most effective use of these last few lines—strainers of all kinds—even hand and motor operated scraper strainer types. We could fill this page with lists of applications, testimonials, and specifications, but it would be eminently more sensible simply to say: Tell us your problem.

Write us direct, or contact your local Sarco sales representative or sales office.

Pardon our monopolizing the conversation in this series of paid communiques, but we're trying our best to interest you in certain subjects that concern us both—to the point where you'll communicate. 5902

SARCO

SARCO COMPANY, INC.
635 MADISON AVENUE, NEW YORK 22, N. Y.
PLANT: BETHLEHEM, PA.

STEAM TRAPS • TEMPERATURE CONTROLLERS
STRAINERS • HEATING SPECIALTIES

Astrosonics engineers catch spray droplets to study particle size.

Spraying with Sound Waves

This week in its new laboratory at Syosset, N. Y., Astrosonics Inc. is testing spray patterns and studying droplet sizes produced by bombarding liquid streams with sound waves (photo above). As the first major commercial effort aimed solely at sonic production of a wide variety of liquid sprays and mists, it could solve the chemical process industries' two major spraying process problems — particle size control and spray nozzle wear.

The five-month-old firm is already setting up the first commercial application for its new sonic spray nozzle—in an equipment-parts cleaning unit. The claims for this new unit —that it is 20% lower in cost and requires less maintenance than comparable sonic cleaners—reflect many of the advantages Astrosonics is touting for its spray drier nozzle.

And the CPI, Astrosonics says, is its principal target. Reason: the list of potential CPI applications is broad, including such operations as drying, prilling, humidification, cooling, wetting and atomization now carried out with conventional spraying systems.

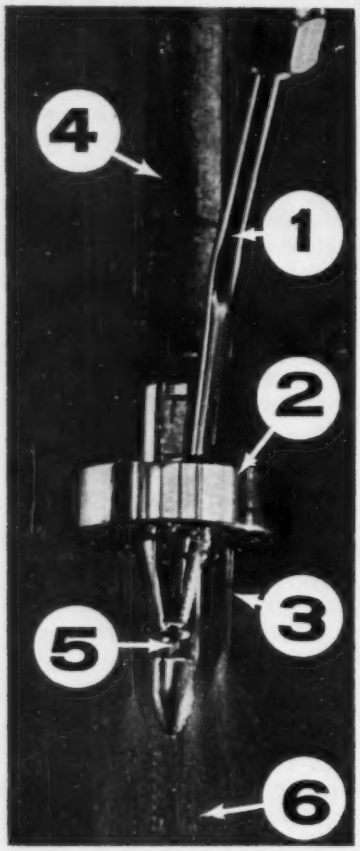
For example, spray drying alone is a multi-million dollar business for equipment sellers—about equally divided between chemical and food processing. It has, however, a particularly bright future in the low-cost processing of large-volume chemicals which might ordinarily be filtered, kilned or drum dried *(CW, June 6, '59, p. 43)*.

Problems in Volume: However, large-volume spray production — as exemplified by detergent manufacture (which produces the largest tonnage of spray-dried products) — often results in nozzle-wear and particle-size-control problems. This is where Astrosonics' new sound-operated spray nozzle has potential advantages over other types, says William Fortman, the firm's director of development laboratories.

In ordinary detergent production, the detergent slurry (containing phosphate, alkyl aryl sulfonate, fatty alcohol sulfate, etc.) is pumped at high pressure (100-150 psi.) through spray nozzles at rates that may exceed 50 lbs./minute into the drying tower. There, the detergent droplets are dried by warm air, form beads or granules which contain about 10% moisture.

But, because all of the droplets formed are not the same size, the smaller beads dry out more than the larger ones, may actually contain only 8% moisture, compared with 12% for the larger beads. And, as a nozzle is used, and its orifice wears, the beads become larger and the moisture content increases. Often, high-moisture-content beads stick to tower walls, force shutdowns for cleaning. Also, high-moisture content is believed to cause a chemical reaction that actually degrades the phosphate in the bead

Dimension



Inside Sonic Nozzle

In Astrosonics' new sonic spray nozzle, liquid feeds by gravity or low pressure (up to 10 psi.) through tube (1) into liquid chamber (2). Holes in bottom of liquid chamber eject liquid in a stream (3). Air or steam at high pressure (normally up to 60 psi. for air—nozzle can withstand 2,000 psi.) —is introduced through pipe (4) to nozzle (5) causing resonator tip to vibrate. Sound waves from resonator tip break up liquid streams (3) into a spray (6).

Throughput rates of 6 lbs./minute of water are normal, but rates as high as 60 lbs./minute may be possible. Spraying rates and patterns will depend on liquid and air feed pressures, sound wave frequency (normally 9,400 cycles/sec.), number and size of holes in liquid chamber. Fluids with viscosities up to 4.8 poises (detergent slurries may be ten times this) are easily sprayed; experiments show that it may be possible to spray high-viscosity syrups.

and results in a loss of detergency.

Moreover, outside the tower the changes in bead size may require adjustments of high-speed packaging lines, which fill on a volumetric basis.

Detergent makers try to cut down on wear problems by using materials such as tungsten carbide in the nozzles. In spite of this, nozzles often wear within a few weeks, must be replaced at a cost of about $100 each—a costly procedure when 10 or more nozzles are in a tower.

Cutting Wear: The Astrosonics' nozzle sells for $395 in small quantities. But, because of its method of operation *(see Dimension)*, wear is not expected to be a problem. The liquid to be sprayed can often be fed by gravity or low pressure because the sound waves (rather than the pressure of the liquid forced through an orifice) cause atomization.

If higher pressures are used to increase nozzle throughput, Fortman figures that wear should not be a problem since up to a 100% increase in hole cross-sectional area would be needed to cause a significant change in product particle size. However, spraying at liquid pressures above 10 psi. hasn't been tried yet.

As long as clean air is used to generate the sound waves, there will be no wear caused by actuating pressures. Steam might also be used instead of compressed air to generate the sound waves, but it, on the other hand, would create wear problems.

Normally 10-60 psi. air is used to generate sound waves at a frequency of 9,400 cycles/sec. (a high pitched sound to the human ear, but no more disturbing than the sounds in a conventional tower). If higher pressure air and high pressure liquid feeding were used to obtain high nozzle throughput, energy costs as well as wear problems would have to be balanced against those resulting from pumping high-pressure liquid with ordinary nozzles.

Particle Control: While some spray products makers (e.g., drug makers) aren't as much concerned as detergent makers with high throughput rates and wear, most all are anxious to fix particle size. Uniform particle size is the key to uniform characteristics (e.g., moisture content) of finished products and uniform physical and chemical reaction rates.

Ordinary spraying techniques have inherent particle-size problems, according to Fortman. The ordinary spraying mechanism is to draw out the liquid into thin streams or filaments which are easily deformed, even by minor outside forces. A slight movement or displacement of the liquid filament causes the filament to neck down at one point, bulge at another. Finally, the filament breaks at the neck. But, according to Fortman, examination of the break under stroboscopic light shows that the break is not clean, actually is a trail-off that results in a small, secondary droplet. Thus, at least two different-sized particles are formed.

In ordinary spraying, the liquid is drawn out into a number of filaments by whirling it in a small chamber before the nozzle orifice, or by ejecting the stream against a whirling disc. In some cases, air or gas is jetted into the liquid stream.

"By striking the liquid stream at relative high frequency with sound waves, we are using a sharper knife to make a clean cut of the liquid stream. This gives a more uniform droplet size," says Fortman.

Under No Pressure: And, unlike normal spraying, where the pressure forcing the liquid through the nozzle orifice is a critical factor in determining particle size, pressure variations with the sonic nozzle have minimal effect on the spray characteristics. The air pressure used for sound generation can have a ±10% variation, and liquid pressure or throughput can drop off well below design minimums without changing the spray. Pressure or throughput cannot go above design limits without changing the spray.

And, the new Astrosonics nozzle can be cocked at an angle, as ordinary nozzles often are, to prevent spray from hitting tower walls. The angle of the spray cone can be adjusted to give even greater than hemispherical coverage (more than 180°) so that some particles are sprayed upward. The wide-angle-spray means that fewer nozzles might be used to cover an area, e.g., in fighting fires with fogs.

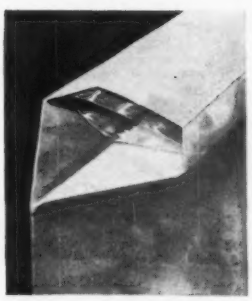
Much experimental work is required to prove out the advantages of sonic spraying for individual process applications. But there is no doubt that with sound a new dimension has been added to the spraying field.

Lock product in with new Poly-Lok film valve insert

Poly-Lok, the latest bag development by St. Regis® chemical packaging specialists, helps end the age-old problem of valve bag leakage and siftage. This new tubular polyethylene film insert provides the tightest possible automatic valve closure.

Poly-Lok utilizes the natural flexibility of thin, pliable polyethylene. When the filling tube is withdrawn, the pressure of the filled bag causes an automatic, extra-tight closure. The result is a self-closing bag designed not to leak even under the most severe conditions of handling and shipping. Further, Poly-Lok forms a barrier against the entrance of foreign matter and moisture that might contaminate your product.

Poly-Lok is the most recent example of St. Regis *Packaging-in-Depth*. This complete bag service assures you of the *right* bag, the *right* machinery to pack it, plus the services of skilled engineers. To meet your *future* needs, this program also includes continued research to develop improved packaging methods and economies.



PACKAGING-IN-DEPTH BY St.Regis BAG DIVISION

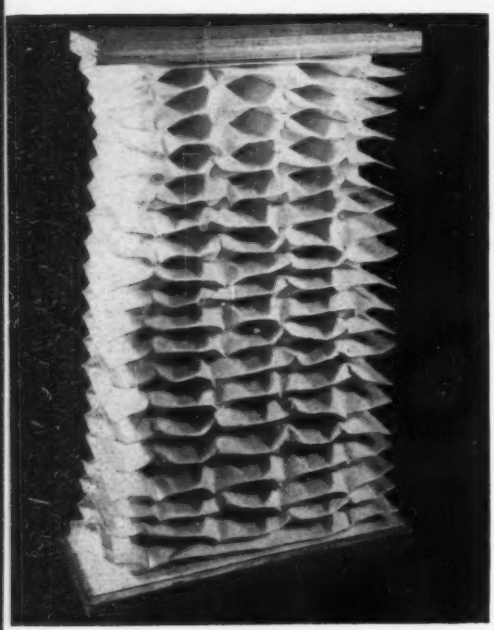
In Canada, contact St. Regis Consolidated Packaging Co., Ltd. PAPER COMPANY

Glue Makes a Cheaper Filter

Mine Safety Appliances Co. (Pittsburgh) is out to capture a portion of the gas filter business with a new, comparatively low-cost unit. Its novel lightweight filter, an extension of the firm's Ultra-Aire series, is claimed to operate at temperatures up to 500 F., with high dust-holding capacity, and capability of stopping micron-sized particles — all at a cost said to be 10% less than that of conventional gas filters.

Secret of the new line is a special adhesive which provides structural strength and eliminates separators. Until now, the filters of this type offered by MSA and two others—Cambridge Filter Corp. (Syracuse, N.Y.) and Flanders Filters, Inc. (Riverhead, N.Y.)—call for separators (generally corrugated aluminum) between layers of the filter media. Besides supporting the filters, the separators provided gas passages.

Elimination of the separators increases the dust-holding capacity of the new filter about 2.5 times on a throughput basis—it holds up to 5 lbs. of atmospheric dust in the 1,000 cfm. size with a 2-in.-of-water pressure drop between the inlet and outlet. Part of this extra capacity is due to extra internal space; some (plus the relatively small pressure drop) is due to reduce sidewall air friction. (Filters are seldom operated at pressure drops of more than 2.5 in., because the filters "load" excessively.)



New MSA accordion-like filter is glued into a light, strong, shape.

MSA uses a modified Goodyear Pliobond (synthetic rubber, phenolic resin, acrylonitrile) adhesive to bond the filter element into its accordion-like structure (*see cut.*) The open ends are sealed to the filter frame. This construction contributes to the filter element's low cost (about $80/1,000 cfm. size compared with $90 for conventional filters) and light weight element weighs 9 lbs. compared with 35 lbs. for comparable filters).

AEC — Prime Buyer: The Atomic Energy Commission is now the biggest user of the conventional, separator filters made by MSA, Cambridge, or Flanders. All three makes are improved versions of filters developed for WW II's Manhattan Project by the U.S. Army Chemical Corps in conjunction with Arthur D. Little Inc. They are guaranteed to be capable of removing 99.97% of particles larger than 0.3 microns. But they are expensive—annual installation-and-operating cost is $35-65/-1,000 cfm.

The new MSA line will have a hard time penetrating this market because the AEC specifies separators in the units filtering the gases entering or leaving areas of high radiation. Although MSA has a conventional separator filter, Cambridge's Absolute and Flanders' Airpure filters have the lion's share of this market now.

But there are a number of industrial applications where MSA's new line may prove superior. A test use is to remove potentially harmful lubricants and other contaminants from highly compressed process gases. Another application: removing impurities from the argon used to blanket the metals (e.g., zirconium) in electric furnaces. The filter plays a key role in the case of zirconium—it extends the allowable heat-up time from 4 to 30 hours without excessive impurity buildup in the metal.

All Not Rosy: However, there are certain disadvantages to the new MSA line. Case in point: the adhesive used in the filter limits its operation to temperatures below 500 F. Filters with separators can be used up to 800 F.

In addition, the MSA filter media is glass web, which produces an initial pressure drop of up to 0.9 in. water. The glass paper media Flanders uses has a more open weave and produces an initial pressure drop of 0.7-0.75 in. The Cambridge filter — glass-asbestos media — results in a pressure drop of 0.85-0.95 in.

MSA is now working on a new filter media that promises to cut the pressure drop to only 0.60 in. of water.

Filters of all three manufacturers are sensitive to differences in the upstream and downstream pressure. Chemical plant men have reported that filters have a tendency to rip when they are being installed unless the upstream and downstream pressure is carefully equalized. MSA claims, however, that it has a comparatively strong element—capable of taking a 10-in. pressure difference without tearing or deforming.

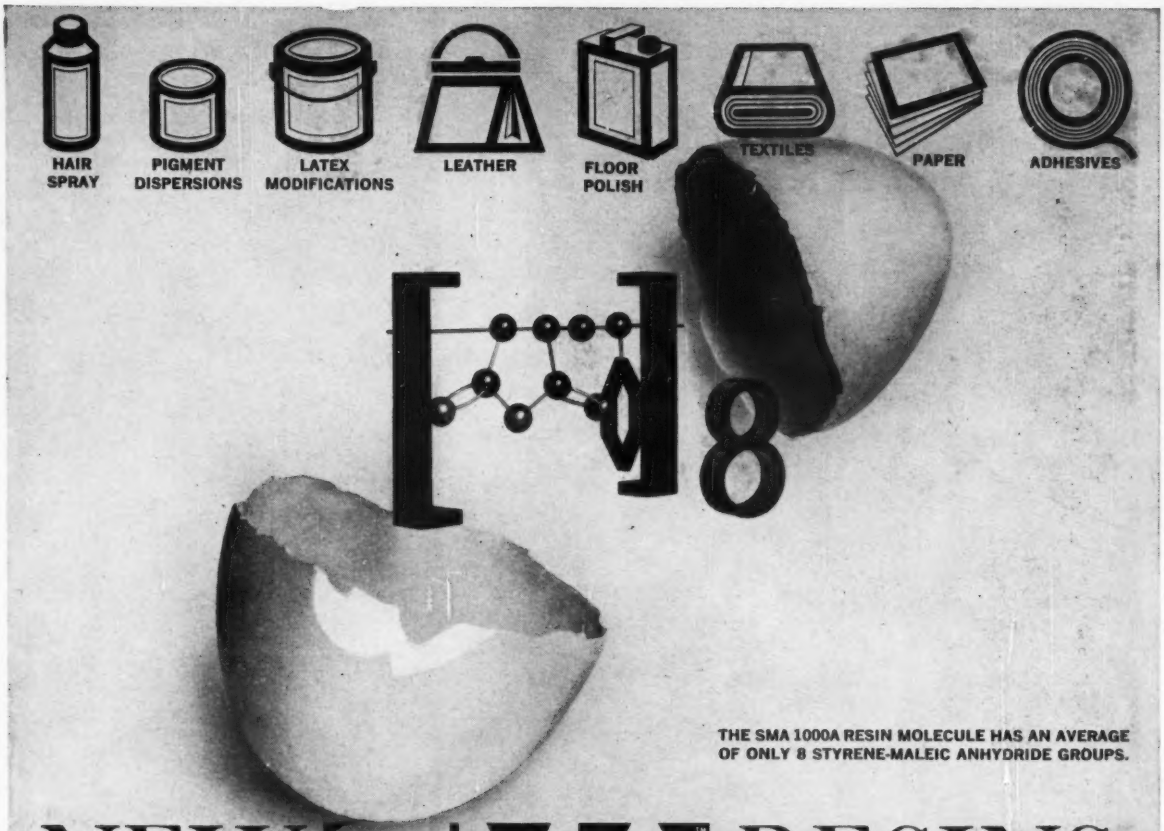
Despite the disadvantages of the new MSA line, it promises to be a helpful solution to many of the chemical industry's high-efficiency filtration problems.

TV in Miniature

Newest entry in the miniature industrial television field is a 3-in. diameter camera made by E. M. I. Electronics, Ltd., in England, and marketed in this country by the Electronics Division of Fairbanks, Morse & Co. (Yonkers, N.Y.).

The camera is 9-in. long and will fit snugly into a 3-in. diameter pipe with its regular casing that offers protection from noise, vibration and dust. However, with a waterproof casing, the diameter would be increased to 3¼-3½ in. The small-diameter pipe inspection service provided by Industrial Pipe Repair Corp., College Park, Md. (*CW, May 27, p. 81*) gets down to 3 in.

The camera's major talking point is its video system which gives 650-line resolution. Normal radio-frequency systems give 525-line resolution maximum, average about 300-line resolution. This means that the new British import provides a sharper picture, is often able to operate with as little as 1 ft.-candle of light. Cost with remote control: in the $2,000 range.



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Evaluate these newly-created *low molecular weight* styrene-maleic anhydride copolymers. Their short chain length (molecular weight approximately 1600), polyanhydride structure, alkali solubility, and surface active properties can be your key to new or improved products. A few potential application areas for SMA resins include use as a **chemical intermediate** utilizing reactive anhydride groups; **latex modification** (of commercially available latexes) to alter their performance in the paint, textile, leather and paper industries; as **protective colloids** in emulsion polymerizations to achieve improved properties; as **dispersants** for hydrophobic pigments to achieve high solids, low viscosity dispersions; as a partial or complete **replacement for shellac** in emulsion floor polishes and in other shellac applications. Perhaps these potential applications suggest to you other uses for SMA resins, now available in semi-commercial quantities. Samples and data are now available from TB&C. Please request on your company letterhead.

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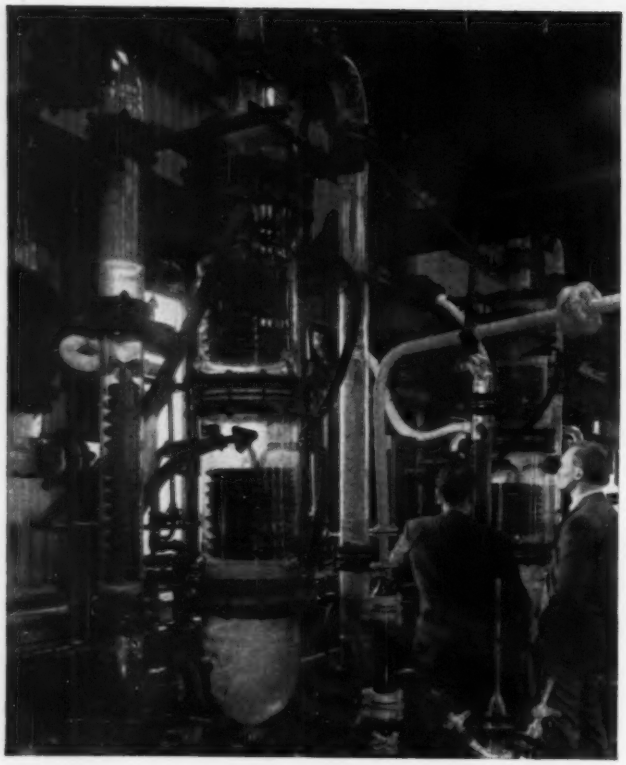

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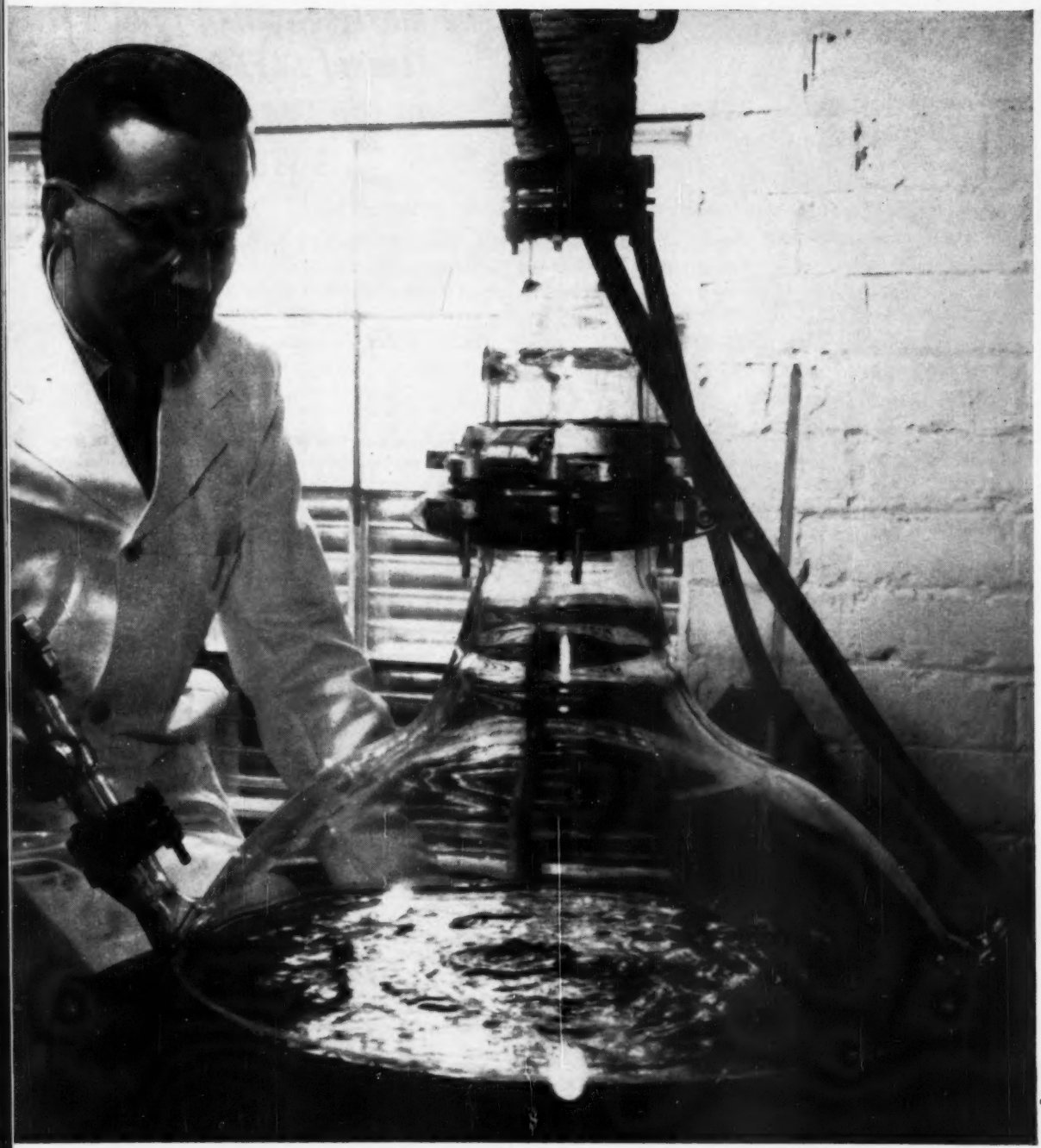

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For more information on the possibilities, advantages, and economies of unit processing your product in glass, write Plant Equipment Department, 3107 Crystal St., Corning, New York.

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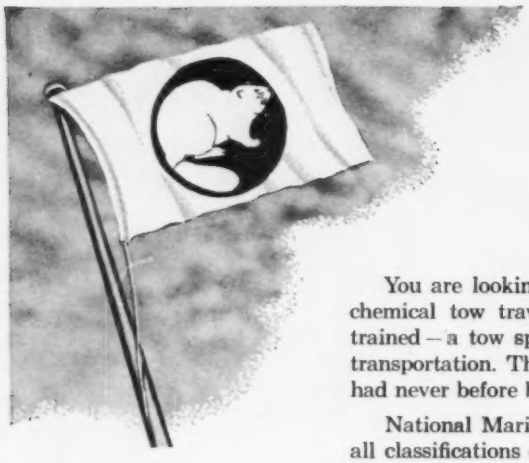

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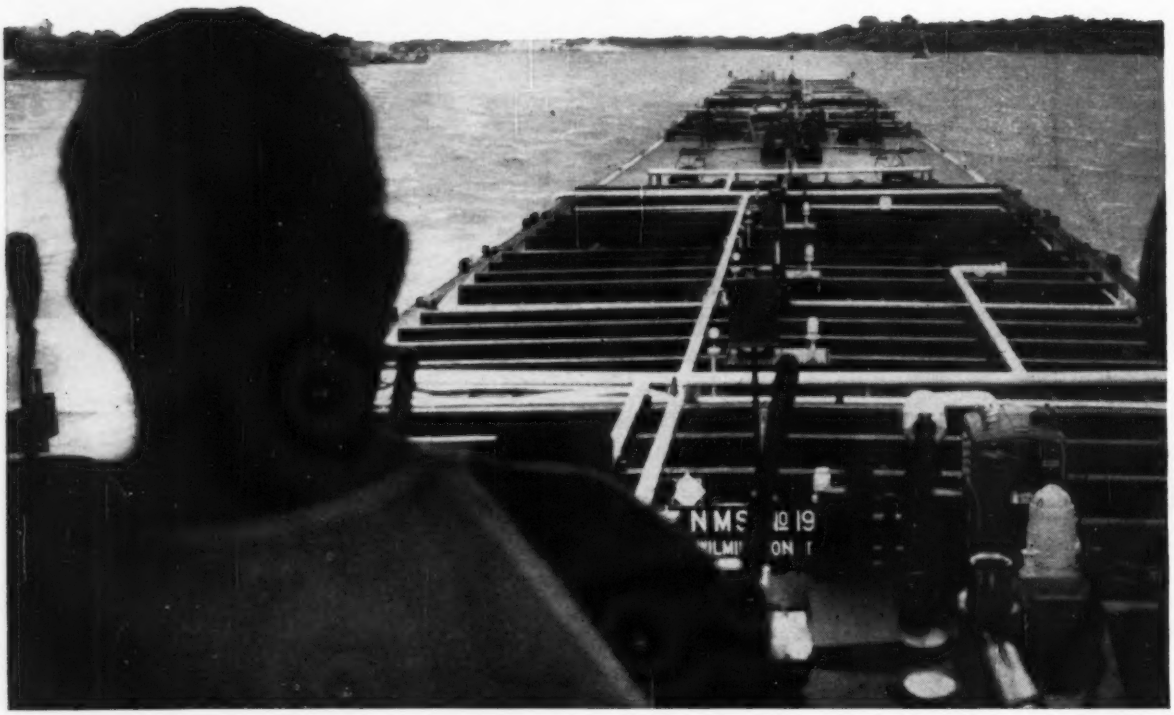

Market Newsletter

CHEMICAL WEEK
July 15, 1961

The whopping acrylonitrile price cut from 23¢ to 14.5¢/lb. initiated last week by American Cyanamid—and the alacrity of other marketers in following suit—underscore dire straits in which producers are caught. That acrylo producers were heading into serious trouble was clear a long time ago (*CW, Oct. 29, p. 109*). The big surprise: suddenness and size of the price collapse.

Crux of the problem: Overcapacity of roughly 50%. U.S. acrylonitrile output in '60 was about 218 million lbs.; capacity will shoot to more than double that when Du Pont's second plant, at Beaumont, Tex., comes onstream in the near future.

Acrylonitrile producers have been left scratching for new outlets to absorb the over-abundance of acrylonitrile aggravated by self-sufficiency of two top acrylic fiber producers—Du Pont and Chemstrand. Du Pont will soon have 100 million lbs./year of captive capacity; and Chemstrand will get its acrylonitrile from Monsanto, which now has full ownership of the acrylo-consuming company (*Business Newsletter, Jan. 28*).

Next largest outlets for acrylonitrile—nitrile rubbers and plastics—are growing steadily, but not fast enough to solve the overcapacity situation. Acrylo producers apparently hope that the new bargain price will speed up this growth and spur use of acrylonitrile in new areas.

Union Carbide, Standard Oil of Ohio, and Monsanto have indicated readiness to follow Cyanamid in the price cut; B.F. Goodrich says it's not involved because its output is for captive uses.

•

In some cases the big acrylo price cut may be more illusory than real. Some buyers reportedly have been getting the chemical at 16¢/lb. on contract basis; if the contract price also drops to 14.5¢—and most contacts contain such provisional price adjustment clauses—the actual saving in these cases will be 1.5¢/lb. rather than 8.5¢.

•

Overproduction of ammonium fertilizers in Italy and West Germany has aborted plans to set up Lebanon's first ammonia plant (80—100,000 tons/year capacity). A 24% price cut on ammonium sulfate imported into Lebanon from the producing countries killed the plan.

Another factor discouraging the Lebanese: Neighboring Syria (with Russian aid) and Iraq (with Czech aid) are planning their own ammonium fertilizer industries; Lebanon's domestic consumption of ammonium fertilizers is only 28,000 tons/year and export markets would have been needed to support a plant of the size planned.

Price boosts on nickel salts—ranging from 1½ to 8½¢/lb.—reflect the recent 7¼¢/lb. increase on the metal. New quotes: Nickel acetate, 72¢/lb.; carbonate, 83¢; chloride, 39½¢; formate, 78¢; nitrate, 34½¢; oxide, 92¢; sulfate, 30¢/lb.

•

Du Pont is slashing price of Teflon 100 FEP-fluorocarbon by 30%, from $9.60/lb. to $6.60/lb. in truckload quantities. The reduction on this relatively new, small volume fluorocarbon is unrelated to the recent big price cut on Teflon rods by Tri Point Industries; the rods are made of Teflon TFE whose price, says Du Pont, remains firm for the present (*CW Market Newsletter, July 1 and 8*).

Du Pont is also adding two new FEP products to its line: Teflon 110, designed for injection molding uses and Teflon 120, a water-base dispersion containing about 55% FEP solids.

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Phillips Petroleum is touting use of cis-4-polybutadiene in tires. The firm's research and development department says cis-polybutadiene can tolerate more carbon black and processing oil than does natural rubber. Result: lower-cost finished rubber compounds.

Phillips figures that a 60-40 blend of cis-polybutadiene and natural rubber, when extended with 70 parts carbon black per 100 parts of blend, would compare favorably with 22¢/lb. natural rubber using conventional carbon loadings.

On a tire-mile basis, improved performance puts the cis-polybutadiene natural rubber blend on the same basis as stock made from 10¢/lb. natural rubber. Current spot price of No. 1 smoked sheets of natural rubber actually cost much more—30.5¢/lb. delivered in New York.

•

The cost of sulfur production is shaved by $4/ton as a result of broad company reorganization of Azufrera de Veracruz, Gulf Sulphur's Mexican subsidiary. President Robert Allen of Azufrera says his firm eliminated royalties amounting to about $2.76/ton to private individuals by exchanging them for Gulf Sulphur stock. The royalty liquidation aids production costs, also complies with spirit of new Mexican low condemning the sulfur royalty system.

Azufrera now produces over 850 tons/day of sulfur; if this rate is maintained through '61, the firm will be able to ship 250,000 tons/year.

•

Bids on 50 tons of potassium hydroxide are invited by Yacimientos Petroliferos Fiscales (Argentina). Conditions include metal drum packaging, immediate delivery (in one shipment), complete chemical analysis.

Bids open July 18 (noon, Argentine time) at YPFS Buenos Aires tenders office and at the firm's New York office.

CHEMICALS OUTLOOK

July, 1961

This bulletin is published to keep you posted on Wyandotte key chemicals, their applications, and the many services Wyandotte offers. You may want to route this to interested members of your organization. Additional information and trial quantities of Wyandotte key chemicals are available upon request . . . may we serve you?

BRIGHT FUTURE FOR SPRAYABLE RIGID URETHANE FOAMS

About a year and a half ago, through the spray application of rigid, solvent-blown, polyether urethane foams, Wyandotte introduced to industry the most efficient and the most practical insulation material available today. This new method of insulation has proved itself since that time, and practical applications are proceeding rapidly.

As a practical demonstration of what could be done with formulations based on its polyols, Wyandotte Chemicals has spray-applied 30,000 board feet of foam in its own facilities. And foam formulators with whom Wyandotte has been associated have sold enough liquid-spray foam components to prepare a total of well over one million board feet of foam. Moreover, industrial insulation applicators of rigid foams have bid on jobs exceeding one million board feet of foam solely for application in the first part of 1961. More and larger applications are expected in the very near future as evaluations of service test applications are completed.

A recent application involving Wyandotte's formulations was the insulation of two 500,000-gallon caustic storage tanks at the Eldorado Terminal in Bayonne, New Jersey. 7,550 board feet of sprayed urethane foam were used on each tank. It was applied to brush blasted, primed steel surfaces, the walls receiving one inch of foam and the roof one-half inch. A fire-retardant mastic was then sprayed on the foam surface at a dried film thickness of 10 mils. The applied application cost was approximately 2/3 that of a comparable insulation job at the Eldorado Terminal, using another insulating medium.

If you would like more information with, perhaps, suggested methods of application and application possibilities, write us any time. For prompt attention, address inquiries to Department CO.

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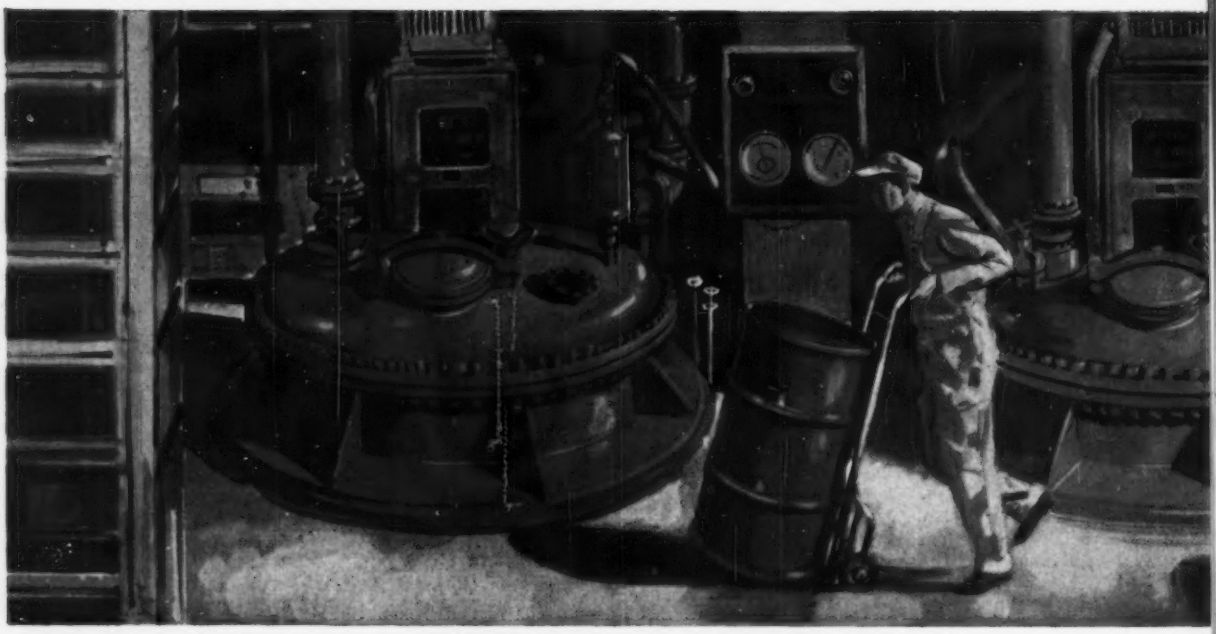

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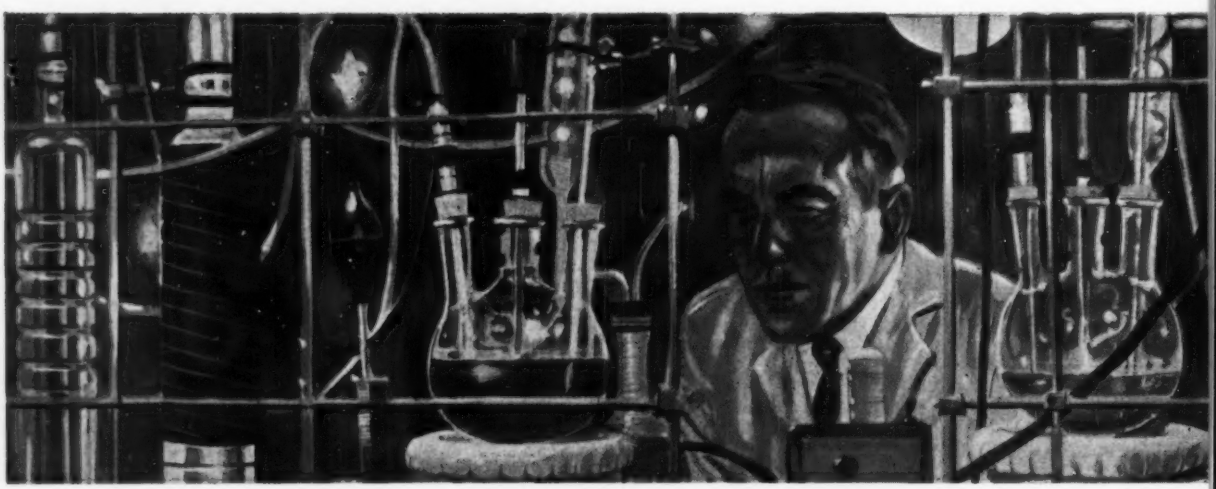

Rohm & Haas offers these aids to research and development chemists and engineers working on polymers:

Acrylic Monomers—a wide range. You can make selections from a broad variety of both acrylates and methacrylates. They polymerize individually or in combinations—by bulk, suspension, solution, or emulsion methods—to produce polymers, ranging from soft, rubbery materials to rigid plastics.

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Product applications for acrylic monomers include: latex paints, other emulsion and solution coatings, plastic sheets and molding powders, textile finishes,

Rohm & Haas acrylic monomers

paper coatings, leather finishes, adhesives, oil additives.

Literature—The Acrylic Library. Twenty booklets and bulletins. Covers subjects such as polymerization mechanisms, copolymerization, emulsion polymerization, catalysts, physical and chemical properties.

Technical Service. When you're ready to go into production, Rohm & Haas engineers will help you design storage and handling facilities for acrylic monomers. If you need more than one monomer, a representative will help you analyze carrier rates to show you how costs can be cut by ordering in compartmented tankcars or tank trucks, or mixed truckloads of drums.

To get the Acrylic Library write on your company letterhead to Dept. SP-5. Monomer samples are also available.

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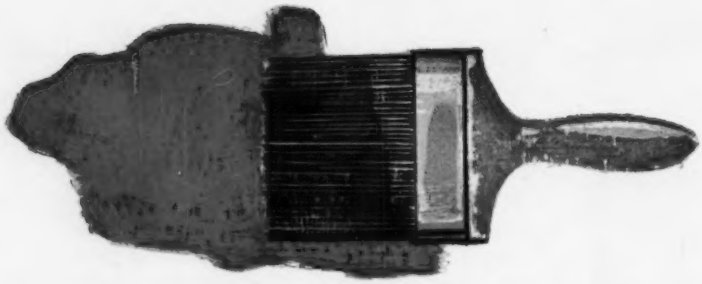

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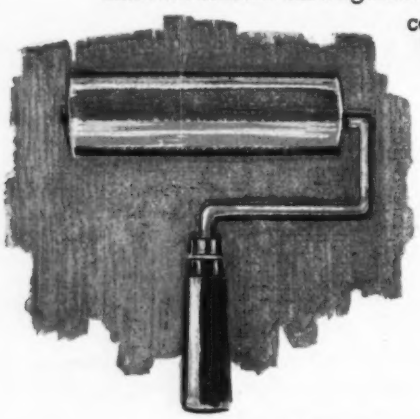

CHEMICAL DIVISION

DELHI-TAYLOR OIL CORPORATION

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CW PHOTO—JOAN SYDLOW

Chemical coordinator Jackson (right) and his deputy plot Jersey's international chemical growth.

Jersey's Giant Strides in Chemical

When all its new plants go onstream in the next few years (table, p. 112) Standard Oil Co. (N.J.) will wind up running one of the largest overseas industrial chemical operations of any U.S. company.

With oil in troubled waters, Jersey Standard has been putting more and more stress on petrochemicals. Its U.S. chemical marketing operation, Enjay Chemical Co., is already one of the country's 10 biggest chemical companies. Jersey's world-wide chemical sales were $295 million, mostly domestic. But its foreign sales are growing fastest.

This year and next, Jersey will spend about $100 million on petrochemical projects. Most of these will be overseas, where the market is growing fastest and there's more room for newcomers to dig a foothold.

By the end of this year, Jersey will have 25 chemical plants onstream in Canada, Europe, and Australia—most of them wholly owned. By the end of '64, 13 more are slated to start operations, and still others will be under construction or completed.

With this vast enterprise swelling up, the parent is gradually adjusting to accommodate it. Last year, Jersey put itself through a major reorganization, gearing for its stepped-up marketing drive in the U.S. and tougher, changing conditions abroad. More shifts are in the works, as the intricacies of the international chemical industry are imposed on a structure built to handle oil.

Patterns of Growth: The pattern of Jersey's overseas chemical development differs from that of most other U.S. chemical companies, particularly in Europe. Surging into Europe in the last few years, most U.S. chemical firms found local industry left them little room to expand in the heavy merchant chemicals. Instead, they built a position around more sophisticated or specialized products like plastics and fibers, where they had a more exclusive position.

But Jersey, because of its raw material position, has been able to build a solid position in basic petrochemicals, such as solvents and aromatics.

In the future, more of Jersey's plants will be built to make the more sophisticated products. That's clear from the continued upgrading of Enjay Chemical Co.'s product line (Enjay is a division of Jersey's major U.S. affiliate, Humble Oil & Refining Co.).

Following the industry's vertical integration trend, Humble is upgrading its line. Last year Humble started polypropylene production, under a Ziegler license, introduced its butadiene-styrene copolymer, Buton resins, and two new rubbers, chlorobutyl and butyl latex, and has been expanding its two butyl rubber plants.

Jersey already has a butyl plant operating in France, and another one under construction in England. It's marketing Buton in Europe, and is considering putting up a plant there. With Jersey sinking 25% of its research expenditures into chemicals,

Leaders of Jersey's Chemical Growth

CW PHOTO—W. ROSENBLUTH

Contact Director Fisher heads refining operations, including chemicals.

CW PHOTO—JOAN SYDLOW

Coordinator Jackson's group guides chemical development, while . . .

CW PHOTO—W. ROSENBLUTH

Market coordinator Richards advises affiliates on sales methods, and . . .

Esso International's chemical chief, Rose, runs Jersey's chemical trading.

"stressing plastics and rubbers as well as resins, fibers, detergents, and basic chemicals," it's reasonable to expect a grading up of its overseas chemical production.

New Paths: But Jersey's chemical growth abroad won't be a carbon copy of its U.S. development. Its raw material position and the opening of virgin chemical territory in the developing nations will give it opportunities it hasn't had in the U.S. For example, through its overseas operations, Jersey is entering the fertilizer industry for the first time. It's building ammonia plants in Columbia, Aruba, and England, will sell some of the Latin American plants' output to the local fertilizer plants in which it is taking a minority interest.

And Buton may grow faster in Europe than in the U.S. "Europeans use plastics more imaginatively," Chemical Coordinator Robert Jackson notes.

Polypropylene is one product in which Jersey doesn't see much of a future for itself overseas, though Enjay is pushing it in the U.S. The reason is that Montecatini and its licensees have the European market pretty well sewed up. Scandinavia may be one exception. Jersey's Swedish affiliate is marketing polypropylene, holds a Montecatini license.

"We wouldn't go into the market unless we thought there was a good chance of manufacturing," a Jersey executive observes.

Organization in Flux: With its chemical expansion program in high gear and new plants coming on-stream all over the world, Jersey's home office and the complicated relations between its many parts is under heavy pressure. Key executives are spending as much time traveling abroad as they are at their desks. Overseas affiliates with little experience in chemicals are learning to run chemical plants, to sell their own new products and those from elsewhere in the world. New trading and logistical patterns are being woven. To get things done, formal organizational lines are leap-frogged by numerous phone calls and informal personal contacts.

Unlike most of the major chemical producers with large overseas chemical operations, Jersey has not set up a separate international division or subsidiary to coordinate and manage its chemical exports and foreign production. It has no worldwide marketing entity corresponding to Enjay in the U.S. Line authority over the affiliates is vested all the way up at the Board of Directors, but the affiliates deal exclusively with no one man or group in the parent company.

The basic principle governing Jersey's organization is "decentralized management with centralized coordination." In practice, this is pretty much the rule for most large overseas chemical operations, with overseas plants set up as subsidiaries, often with local equity participation, instead of as branches. But few companies have structuralized the concept to the extent that Jersey has.

Parental Advice: Jersey is set up as a holding company, coordinating the activities of its operating affiliates from its compact offices in New York City's Rockefeller Center. It has no operating function of its own. It approves and finances capital expenditures, sets broad policy lines, chooses or approves affiliates' executive personnel, provides these subsidiaries with help and advice on a staff service basis. The affiliate managers run their own businesses, are responsible for profit and loss.

The active control center of the parent company is its 15-man Board of Directors, headed by President Monroe Rathbone and Chairman Leo Welch, and the Board's six-man executive committee.

Jersey's directors are all full time executives. They divide supervision of Jersey's functions and the operations of its affiliates by function and region. For each function—refining, marketing, crude petroleum productions, and transportation, there is a supervising, or "contact" director acting as the Board's representative. They are concerned with coordinating operations both in the U.S. and abroad.

There are also regional contact directors (directors often wear two or more hats—functional and regional), covering Europe, the Mediterranean, and West Africa; the Middle East; the Far East; Canada; the U.S.; and Latin America. Their job is to super-

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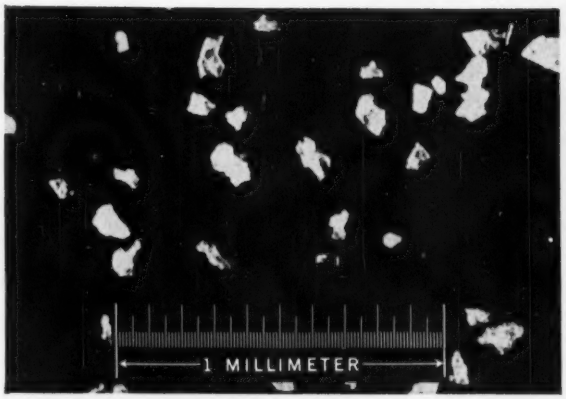

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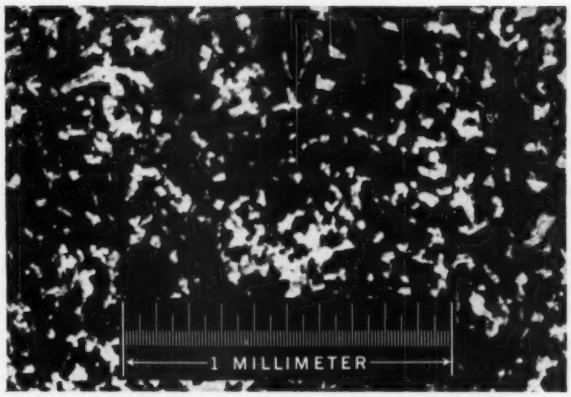
TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

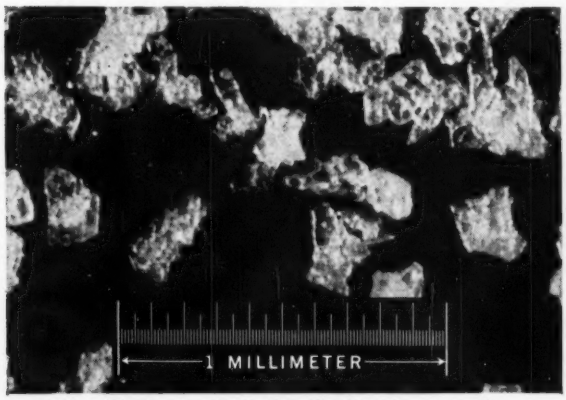
42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	.5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%



Sodium Bicarbonate U.S.P. Fine Powdered No. 3DF for use specifically in dry powder fire extinguisher mixes, also in rubber and plastics blowing, lubricant for sheet vinyl.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

170 Mesh	Trace	325 Mesh	25.0%
200 Mesh	2.0%	400 Mesh	45.0%



Sodium Bicarbonate U.S.P. Granular No. 5 for use in effervescent salts, other pharmaceuticals and special types of cleansers.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh	Trace	100 Mesh	92.5%
65 Mesh	27.0%	170 Mesh	99.0%
80 Mesh	66.5%		

Sodium Bicarbonate U.S.P. Treated Free-Flowing for use in fire extinguishers and sponge rubber.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	.5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%

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Standard Oil Co. (New Jersey) Overseas Chemical Plants

	Location	Products	Capacity	Onstream Date	Affiliate
Canada	Sarnia, Ont.	Ethylene, butadiene	10,000 bbls./-calendar day of feedstock	1958	Imperial Oil Ltd.
		Tetrapropylene, detergent alkylate	30 million lbs./year	1957	
		Aliphatic solvents	600,000 bbls./year	1958	
		Benzene	30 million U.S. gal./year	1961	
	Redwater, Alta.	Sulfur	10 long tons/day	1956	
Netherlands Antilles	Aruba	Ammonia	300 s.t./day	1963	Antilles Chemical Co. (may take minority interest)
		Urea, Complex fertilizer	250 s.t./day 400	1963	Aruba Chemical Industry (may take minority interest)
Costa Rica	Puntarenas	Complex fertilizer	—	1962	Fertica de Panama (may take minority interest)
El Salvador	Acajutla	Compound fertilizer	—	1962	Fertica (may take minority interest)
Columbia	Cartagena	Ammonia Nitric acid	300 s.t./day 150	1962	Amocar
		Urea, Complex fertilizer	250 s.t./day 400	1962	Abocol (may take minority interest)
United Kingdom	Fawley	Heptene	15,000 m.t./year	1957	Esso Petroleum, Ltd.
		Propylene	25,000 m.t./year	—	
		Ethylene, Butadiene	40,000 l.t./year 42,000	1958	
		Sulfur	100 l.t./stream-day	1954, 1958	
		Lube oil additives	14,000 l.t./year	1956, 1961	
		Butyl rubber	30,000 l.t./year	1963	
	Purfleet	Aliphatic solvents	100,000 bbls./year	1956	
	Milford Haven	Ammonia	150,000 l.t./year	1964	50-50 subsidiary with Fisons
France	Port Jerome	Aliphatic solvents	200,000 bbls./year	1949	Esso Standard S.A.F.
		Lube oil additives		1954, 1960	
		Tri- and tetrapropylene	40 million lbs./year	1955	
		Detergent alkylate	40 million lbs./year	1959	
		Sulfur	20,000 m.t./year	?	
		Ethylene, Butadiene	36,000 m.t./year 8,000 m.t./year	1959	
		Para-xylene, Ortho-xylene Solvents	16,000 m.t./year 28,000 10,000	1962	
		Propylene, high purity	10,000 m.t./year	1962	
		Butyl rubber	20,000 m.t./year	1958	Socabu (78% interest)
Germany	Cologne	Ethylene, Butadiene	5,300 bbls./calendar day of feedstock	1959	Esso A.G.
		Ethylene, Butadiene Tetramer	5,100 bbls./c.day of feedstock	1961	
	Hamburg	Aliphatic solvents	600,000 bbls./year	1960	
Holland	Rotterdam	Benzene, Toluene, Xylenes etc.	220,000 m.t./year	1963	Esso Nederland
Belgium	Antwerp	Aliphatic and aromatic solvents	220,000 bbls./year	1960	Esso Belgium
Sweden	Stenungsund	Ethylene, Butadiene	7,000 bbls./c.day of feedstock	1963	Svenska Esso
Australia	Altona	Sulfur	40 l.t./stream day	1959	Standard-Vacuum (50-50 with Socony Mobil)
		Ethylene Butadiene	41,000 l.t./year 21,000	1961	Altona Petrochemical (through Stanvac)
		SBR rubber	30,000 l.t./year	1961	Australia Synthetic Rubber (through Stanvac)
Japan	Kawasaki	Ethylene Butadiene	40,000 l.t./year 7,000	1962	Toa Sikiyu (through Stanvac)

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vise corporate affairs and day to day operations of the subsidiaries within each of their six geographic areas.

Reporting to each of the functional coordinating directors are coordination departments, which provide the technical advice to the affiliates and the information on which the Board acts. Three of the regional contact directors also have coordinating staffs under them. This does not hold true for the U.S., Canadian, and Far Eastern areas because operations there are concentrated in major subsidiaries.

Chemical Center: Under this setup, Jersey's chemical operations fall under the purview of the refining, marketing, and transportation contact directors and their coordinating staffs, and under the regional directors. In practice, the refining department, under contact director H. W. Fisher, assumes the greatest responsibility for Jersey's overseas chemical operations.

"Four or five years ago when we were getting into foreign chemical production, we wondered how to set up the organization," Fisher explains. "We finally put the Chemical Advisory Group in the refining coordination department. It's a little bit illogical because the group also looks into marketing and other functions. But it makes sense after all because essentially it is a manufacturing function. It really follows the same pattern Jersey uses for oil."

Within the department, the chemical group is headed by Robert Jackson, and his deputy, Bryson Filbert.

The chemical group is small—only 14 men—but its responsibilities are large.

Officially, the chemical group, like the rest of the refining department, is concerned with developing and coordinating domestic as well as overseas chemical production. But because the U.S. operation is so "matured," domestic matters don't take up more than 10-20% of the group's—or the department's—time.

The chemical group's prime responsibility is the development of new chemical projects. It is also concerned with how successfully the affiliates are running their overseas chemical operations, and once a year presents a report to the Board on Jersey's world-wide chemical position and operations.

On paper, the regional contact directors and their staffs are also concerned with the economic performance of the affiliates's chemical operations. But because of its specialized nature, the regional directors leave most of the chemical plant supervision to the refining department.

Since the affiliates are supposed to run their own show, the chemical group acts in an "advisory" capacity, though its "advice" necessarily carries a lot of weight.

The idea for a new project most often is born in the chemical group, though it can come from the affiliates or other departments. In any event, it's for the subsidiary to decide whether to formally present the project to the Board. It might do so against the chemical group's advice.

The chemical group helps the affiliate put together the presentation, gathering economic, technical, and marketing data from wherever it has to in the organization. It helps shape the project, and fits it into Jersey's over-all operations. And it helps in local preparation for the project and in getting it started, often borrowing experts from other departments and subsidiaries. How much help of this kind is needed depends on the size and experience of each affiliate.

Marketing Guide: With the host of new plants coming onstream, Jersey's marketing coordination department is becoming increasingly concerned with chemicals. In April it formed a chemicals division under P. L. Richards. Its function: to review the marketing policies and methods of subsidiaries, help them set up marketing organizations, training salesmen, etc. Its major concern is the smaller affiliates just getting started in chemical marketing. Right now the division is composed of only three men. In the next few weeks it will be expanded to about 10.

Moving it Around: Actually, a major focal point for integrating Jersey's world wide chemical operations is located outside the parent company and its functional coordinating departments. This is Esso International, the operating subsidiary responsible for all movements of crude and products between affiliates. Its name was changed from Esso Export Corp. in May to reflect its handling of movements between overseas affiliates, not just U.S. exports.

About a year and a half ago a chemical department was set up with-

How to buy Anhydrous Ammonia and Nitrogen Solutions

by George Day

About the Author. Twenty-four years' experience serving customers are George Day's qualifications for writing about buying and selling an industrial commodity. For the last six of his 24 selling years, George has been working with customers who buy Ammonia and Nitrogen Solutions.

* * *

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in the company, headed by H. J. Rose. Prior to that, Enjay handled its own exports, and what little chemical trade existed between the foreign subsidiaries was handled by them directly. With its overseas chemical operations expanding, Jersey needed an organization to centralize functions like pricing, transport, export and purchasing. Right now exports from the U.S. are still the major part of the chemical division's business, but International's executives foresee the time when chemical trade between the foreign affiliates will exceed that from the U.S.

When a subsidiary needs a chemical (or has a surplus it wants to dispose of outside its own marketing area), it goes to Esso International, which tries to negotiate the purchase or supply of the product from some other Jersey subsidiary, in the U.S. or abroad; or, if that is impossible, with some outside company.

Aside from some special situations (such as supplying feedstock to a company outside an affiliate's marketing area), Esso International does no selling on its own. But, like the marketing coordinating department's chemical division, it does help the subsidiary to sell. But where the marketing coordinator is concerned with broader questions, Esso International helps with on-the-job selling techniques, by sending along sales assistants to help new salesmen. It also helps in negotiations when necessary, provides help with market research and sales analyses, and technical service for products moving between affiliates. Collating data collected by the affiliates, it puts together market research reports for them and the coordinating groups of the parent company.

Teamwork: Jersey's chemical organization does not have the clean lines that make life easy for the organization man. "When you look at the organization chart, you can get confused as hell," an executive confides.

Areas of responsibility overlap. Both the marketing department and Esso International are concerned with selling, for example. And both are involved with technical service—the former, with seeing that the affiliates are doing a good job of it, the latter with providing it in inter-affiliate trade. Likewise, both the refining department's chemical group and the regional coordinator are concerned with profit performance.

In practice, overlapping is resolved by informal contacts between the groups. Even though Richards is with the parent company and Rose works for a subsidiary, for example, they work closely together. Currently, they are on a series of tours together, primarily to tell all the subsidiaries how Jersey is looking at the chemical business ("Lively and aggressively," smiles Richards.)

One means of tying it all together are the chemical coordinators meetings held every two or three months. These include the chemical coordinators of each of the affiliates, and representatives of the chemical groups in the parent company's refining and marketing departments, and in Esso International. At these gatherings, policies are harmonized, conflicts worked out.

Much of the integration of the various groups is achieved by Jackson's chemical group. When a new project is being cooked up, Jackson draws on market information from Esso International, keeps the marketing coordination group advised of developments that will affect its own problems. When special problems come up, Jackson's group puts together special task forces, borrowing men from the other groups.

Changes Ahead? As Jersey's overseas chemical operations become bigger and more intricate, it's not unlikely that the organization will be tightened up and revamped to correspond more closely with actual relationships and functions.

Tying together the responsibilities of the chemical groups in the refining and marketing departments and in Esso International into a single international chemical affiliate might be one direction Jersey could take. It has considered some such consolidation in the past, and the idea is probably not dead.

Integration on a regional basis is more likely. Esso International already has a London office to handle European trade. And Esso Mediterranean was formed to hold 11 small marketing affiliates. These steps could lead to more extensive reorganization as time goes on. In any case, Jersey's chemical operations are clearly becoming a major world force.

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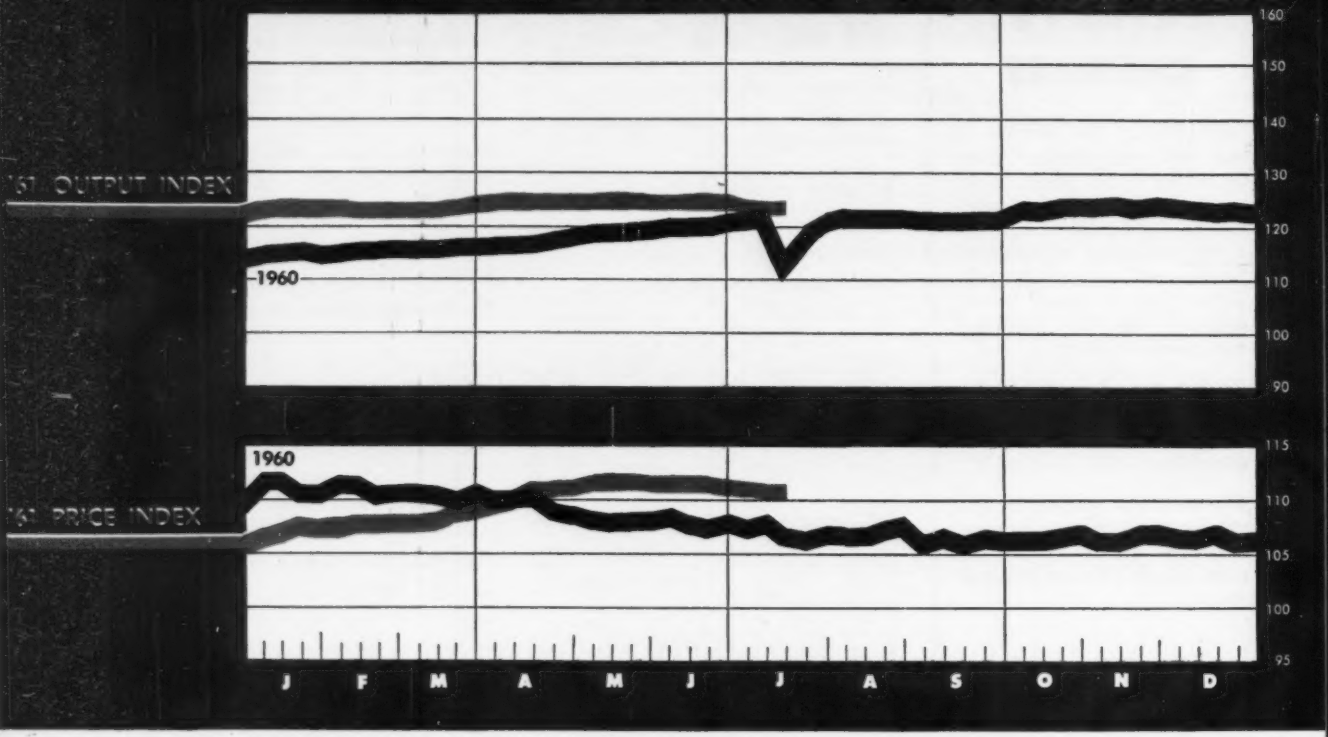

JULY 15, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	123.4	122.7	120.0
Chemical Week wholesale price index (1947=100)	110.8	110.0	107.1
Stock price index (12 firms, Standard & Poor's)	53.24	52.79	51.35
Steel ingot output (thousand tons)	1,925	1,978	1,510
Electric power (million kilowatt-hours)	15,183	14,870	14,646
Crude oil and condensate (daily av., thousand bbls.)	6,888	7,096	6,811

TRADE INDICATORS (billions dollars)	MANUFACTURERS' SALES			MANUFACTURERS' INVENTORIES		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All Manufacturing	30.71	30.12	30.99	53.35	53.38	54.95
Chemicals and Allied Products	2.47	2.40	2.35	4.24	4.26	4.08
Petroleum and Coal Products	3.31	3.25	3.18	3.34	3.37	3.34
Paper and Allied Products	1.16	1.14	1.04	1.65	1.64	1.58
Textile Products	1.22	1.20	1.29	2.74	2.76	2.71

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